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INFORMATION CENTERS IN THE UNITED STATES ARMY:
MOVEMENT TOWARD MATURITY THROUGH
STRATEGIC PLANNING

by

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Information Centers in the United States Army:
Movement to Maturity Through Strategic Planning

by

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ABSTRACT

This thesis reports the results of research focused on US Army information centers and end-user computing management techniques. The effort is designed to provide insight into issues and trends in information center management, end-user computing, and Army information resource management. Models for managing the evolution of individual and organizational computing are presented in terms of their applicability to Army information resource management. Important conclusions of this research were; (1) Achieving the level of information integration desired by Army leaders will require the development of management controls that focus on directing the evolution of end-user computing, (2) The role of information centers in Army information management is poorly defined. Resolving this situation will be an important part of achieving an integrated information environment, (3) End-user computing is a critical part of the information environment that has been virtually overlooked by information resource planners. The integration of this valuable resource into Army information resource planning appears to be critical to the future of Army information processing.

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TABLE OF CONTENTS

I. INTRODUCTION	1
A. THESIS OBJECTIVE	1
B. BACKGROUND	1
C. RESEARCH METHODOLOGY	3
1. Archival Research	3
2. Empirical Research	4
3. Analytical Research	4
D. THESIS ORGANIZATION	5
II. INFORMATION CENTERS IN INDUSTRY	6
A. THE BEGINNING	6
B. INFORMATION CENTER BENEFITS	7
1. Backlog Reduction	7
2. Increased Productivity	8
3. Computer Literacy	9
4. ADP/User Communication Gap	9
5. Quality of Information	10
C. ISSUES FACING CONTEMPORARY INFORMATION CENTERS	11
1. Management Support	12
2. Staffing	12
3. Hardware Support	16
4. Software Support	17
5. Privacy and Security	18
6. Promotion of the Information Center	21
7. Training	21
D. THE FUTURE OF INFORMATION CENTERS IN INDUSTRY	25
1. Reorganization of the Data Processing Function	25
2. Establishing the Information Center as a Profit Organization	27
3. Staffing Requirements	28

4.	Shaping Technology to Fit the Needs of the Organization	29
5.	Integrating Change Management Procedures	29
6.	Future Training Requirements	31
E.	SUMMARY	31
III.	MANAGING THE EVOLUTION OF END-USER COMPUTING	33
A.	BACKGROUND	33
B.	THE MANAGEMENT OF END-USER COMPUTING	34
C.	A NEED FOR CONTROL	36
D.	SELECTING AN OVERALL OPERATING ENVIRONMENT	38
E.	END-USER MATURITY AND THE INFORMATION CENTER MISSION	42
F.	CONTROLLED INTEGRATION OF NEW TECHNOLOGY INTO THE ORGANIZATION	45
G.	THE EVOLUTION OF CONTROL STRATEGIES	49
H.	STRATEGIC PLANNING: KEY TO SUCCESS	51
1.	The Importance of Strategic Planning for Information Systems Management	52
2.	An Approach to Information Center Strategic Planning	54
3.	The Benefits of Strategic Planning	56
I.	SUMMARY	58
IV.	US ARMY INFORMATION CENTERS	60
A.	HISTORY OF INFORMATION CENTERS IN THE US ARMY	60
B.	CURRENT POLICY AND GUIDANCE (DEPARTMENT OF THE ARMY)	64
1.	The Mission	66
2.	Integrated Service Support	68
C.	TODAY'S INFORMATION CENTERS	68
1.	Organization	70
2.	Funding	73

3. Manning	75
D. SUMMARY	77
V. A FIELD STUDY: INFORMATION CENTERS IN THE US ARMY	78
A. THE STUDY	78
B. PERSONNEL ISSUES	80
C. AGE OF THE INFORMATION CENTER	82
D. FINANCIAL SUPPORT	82
E. USER SERVICES AND CAPABILITIES	84
1. The Users	84
2. Supported Software	85
3. Management Training	86
F. CONTROL ISSUES	87
G. THE INFORMATION MISSION AREA (IMA)	89
H. OTHER ISSUES OF INTEREST	91
1. Purpose of Existence (Need vs. Directive)	91
2. Role of the Information Center	92
3. Future of Army Information Centers	94
I. SUMMARY	95
VI. THE FUTURE OF U.S. ARMY INFORMATION CENTERS	97
A. DEVELOPMENT AND COMMUNICATION OF STRATEGIC GOALS	98
1. Defining Long-term Automation Objectives	98
2. Identifying Organization's Automation Integration Stage	100
3. Planning for Evolution Into the Selected Environment	102
B. EXPANDING THE ROLE OF INFORMATION CENTER ACTIVITIES	104
1. Communication and Resistance to Change	104
2. Development of End-User Training Policies	106
3. Establishment of Information Management Policies	107

4.	Defining Information Standards for End-User Activities	108
5.	Development of Program Implementation Standards	109
C.	RELATED ISSUES	109
1.	An Evolutionary End-user Strategy	109
2.	Providing Expanded Services With Limited Resources	110
E.	SUMMARY	113
VII.	CONCLUSIONS AND RECOMMENDATIONS	114
A.	OVERVIEW	114
B.	PRESENTATION OF RESEARCH QUESTIONS	115
C.	CONCLUSIONS AND RECOMMENDATIONS	116
D.	OPPORTUNITIES FOR FURTHER RESEARCH	118
	APPENDIX: THE INFORMATION CENTER SURVEY	122
	REFERENCES	132
	INITIAL DISTRIBUTION LIST	139

I. INTRODUCTION

A. THESIS OBJECTIVE

This thesis examines the current policy and strategic planning objectives for Army information centers today. Additionally, it addresses the issue of end-user computing with regard to maximizing the benefits of the 140,000 microcomputers purchased by the Army over the last three years (GPSCD 1988). Finally, it proposes the use of strategic planning to successfully achieve Army information management objectives in the end-user environment.

The information obtained during this research was used to identify major issues facing US Army information centers today. Planning considerations for Army information management are developed in an effort to address these issues. The outcome of this research should serve to enlighten leaders in Army information management on current end-user computing and information center issues.

B. BACKGROUND

Society is experiencing an unprecedented proliferation of computing technology. This is the result of dramatic technological advances in automation products in the late 1970's and early 1980's. Specifically, while the efficiency of computer programmers and data processing personnel in general increased by two to three times over a ten year period, the price/performance ratio of computer hardware increased by a factor of over 100 (Panko 1988). A large part of this proliferation has been precipitated by the development of the micro-computer. Micro-computers

provided a passage through which multitudes of non-computer users have become players in the world of automation.

End-user computing (EUC) encompasses a broad scope of technology used directly by individuals in need of information system products. It consists of office automation, personal computing, mainframe connectivity, telecommunications, visual presentation techniques, and records management. End-user computing is proving to be one of the most significant phenomena of the 1980's. The advent of end-user computing has transformed a trickle of interest in user developed applications into a flood of requests, procurement, and confusion (GSA 1983; Euske and Dolk 1988). This transformation has led to increased awareness, at virtually all levels of society, of the impact of computers upon common daily activities.

These advances have allowed the US Army the opportunity to enhance the capacity of its most valuable resource, people. Today, technology allows the Army to place micro-computers on the desk of virtually every staff member above the company level. This capability allows Army organizations to generate, store, transfer, and manipulate data with exceptional accuracy and speed, provided that the users are properly trained and educated.

However, the technology is developing at an exceptionally high rate, presenting serious problems for today's leaders. Presently, the military is procuring these technologies in advance of its ability to develop appropriate management control policies (GSA 1983).

The policies needed to effectively manage these technologies are evolving gradually with the development of computer literacy and management experience.

However, the goal must be to elicit immediate management action and support for these policies if we are to avoid significant problems in the future. Proposing strategies for integrating management control of end-user computing technologies is the emphasis of this research.

C. RESEARCH METHODOLOGY

Three research methodologies Archival, Empirical, and Analytical, were utilized in the development of this thesis.

1. Archival Research

This form of research was utilized through a detailed review of pertinent literature regarding three major subject areas: (1) U.S. Army and corporate information center management trends, (2) end-user computing development, management, and controls, and (3) strategic planning benefits.

Information on the U.S. Army information center management and trends was gathered from a thorough review of current and draft revisions to AR 25-1 (Army Information Management Programs), AR 5-3 (Installation Organization Management), DA Pam 25-7 (DRAFT) (Installation Information Services Procedures), and The Army Information Center Planning Guide. Additionally, all available messages, historical records, and guidance were reviewed and analyzed.

Trends in industry were developed through an extensive review of books, trade publications, periodicals, and recent presentations regarding current information center implementations published between 1981 and 1988. Interviews were also conducted with several civilian research firms involved with information center developmental issues. End-user computing and strategic planning issues were also

researched through the review of books, periodicals, and unpublished papers written between 1974 and 1988.

2. Empirical Research

This form of research was conducted through a survey and field interviews. An eight page, semi-structured survey was distributed to information centers at 85 locations throughout the Continental United States (CONUS). This survey requested information about the operating environments of Army information centers supporting end-users in a wide range of command environments.

Personnel at the Department of the Army Office of Information Systems Command, Control, Communications, and Computers (DISC⁴) Policy Directorate were interviewed to determine the goals and objectives for information centers and end-user computing. Also, personnel at the Information Systems Command Headquarters were queried with regard to the methods they use to enforce existing guidance regarding the issues in question. Finally, Directors of Information Management (DOIM) and their information center managers were also interviewed to determine specific implementation policies regarding their services and control methodologies.

3. Analytical Research

Basic statistical techniques were employed to analyze the responses generated from the field study. These tabulations were then used to correlate responses with various management control models. Conclusions drawn from this analysis were utilized to develop recommendations for improving Army information resource management.

D. THESIS ORGANIZATION

This paper is comprised of seven chapters that are designed to provide the information necessary for determining the adequacy of existing and projected policy regarding U.S. Army information centers. The final goal of this process is directed at maximizing the benefits of the electronic workstation and end-user computing through comprehensive planning techniques.

Chapter II discusses trends in information center management in industry. Theories surrounding the management and control of end-user computing are discussed in Chapter III. The chapter emphasizes the need for long-term plans to reach the environment in which the organization would like to operate.

Chapters IV and V focus solely on Army information management and the role of the Army information center. Chapter IV discusses the development, background, and current policy regarding Army information centers. Chapter V documents the results of a field study conducted as part of this research. The two chapters provide insight into the environment in which Army information centers operate.

Recommendations for implementing strategic planning and associated control measures are identified following an analysis of Army information management planning in Chapter VI. Chapter VII provides a concise summary of recommendations and conclusions generated throughout the thesis.

II. INFORMATION CENTERS IN INDUSTRY

A. THE BEGINNING

The information center concept was formulated and implemented as early as 1974 by IBM-Canada (Carr 1988). The original intention of the idea was to gain relief from the constantly increasing backlog of ADP related requests. Following internal success with the idea, IBM began marketing the concept to its customers. (Hammond 1982)

The information center concept met with mild acceptance throughout the information industry prior to 1980. However, the advent of micro-computers in 1981 brought a surge of interest. Within two years managers around the world were dealing with the issues of supporting and managing a new computer resource within the corporation, end-user computing. (Perry 1987)

In 1982, the information center concept was hailed by information systems management personnel throughout the industry as the solution to the problem of managing micro computer users. Many felt information centers were the missing link that would unite novice computer users with the data processing department.

L. W. Hammond published the landmark article on information centers in 1982. He defined the information center concept as follows:

An Information Center is a portion of the Information Systems (IS) development resource, organized and dedicated to the support of users of IS services in activities such as report generation and modification, data manipulation and analysis, spontaneous inquiries, etc. The Fundamental premise underlying an IC is that if provided proper education, technical support, usable tools, data availability, and convenient access to the system, users may directly and rapidly...and willingly satisfy a part of their business area requirements that depend on an IS environment. (Hammond 1982, p. 131)

Information systems management had been searching for a solution to the ADP backlog situation for some time. Hammond's article offered an immediate solution to the problem. The task seemed simple: provide users with access to a computer, the necessary training and resources, and allow them to develop their own applications. The objective of this approach was to effectively reduce the 2-3 year ADP development backlog (Perry, 1987).

The five years (1982-1987) following the introduction of the information center was marked by sweeping changes in the way many organizations managed their corporate and end-user computing assets. Corporate America has embraced the information center concept. However, the benefits expected from information center implementations continue to change. The purpose of this chapter is to define the benefits expected from current and future information centers and to identify critical issues facing the managers of these organizations. The chapter concludes by providing insight into the future of information centers in industry.

B. INFORMATION CENTER BENEFITS

The benefits of information centers typically elude quantitative measurement. We compare and contrast the benefits that were defined by the initial information center concept with those actually experienced by today's managers.

1. Backlog Reduction

One of the most publicized objectives of end-user computing cited by Hammond (1971) was the reduction of the application development backlog in the data processing department (Hammond 1971). This event has yet to transpire. Most

organizations perceive that their ADP development backlog has either remained constant or, in some instances, grown worse (CRWTH 1987). However, this does not mean that information centers have been ineffective for the backlog may have been significantly worse without them.

2. Increased Productivity

The emphasis on productivity is one of the most frequently espoused goals in business today. Virtually every industrial performance statement measures management success in terms of increased productivity, greater output for a given level of input. The Department of Defense has focused on productivity measures in demanding consistent levels of training efficiency while being forced to reduce training expenditures (Bass 1988).

Productivity and efficiency have been major areas of concentration for the computer industry as well (Benson 1983). Past efforts have been directed mostly toward hardware development (Pressman 1987). Today, the emphasis is upon the productivity of a more expensive resource: personnel (Atre 1987). Specifically, the shortage of programmers in the computer industry has mandated the need for increased productivity of all computer users. The advent of end-user computing and its support by the information center has provided a means to bypass the ADP logjam.

In the foreseeable future there will be a need for ADP development of large application programs (Pressman 1987). The successful implementation of the information center has effectively provided the ADP staff with more time for projects requiring professional software development skills. Nearly eighty percent of

data processing departments are experiencing a significant increase in ADP productivity as a result of information center support (CRWTH 1987). Additionally, they spend less time reviewing user requests because the users are more aware of the capabilities and limitations of hardware and software. This results in users generating more accurate, realistic requests.

3. Computer Literacy

The advent of computer literacy has a two-fold impact upon the organization: (1) individuals within the corporation become more comfortable with technology in the office environment, and (2) they are less resistant to change. The sense of accomplishment gained by users through computer training allows them to accept future technological change with a more open mind. This reduction in fear of technology and acceptance of change serves to create a new enthusiasm for their job and a sense of well being. (Gerry and Conner 1987)

The positive return provided by improved computer literacy should be compared with what happens when users are provided with computer assets and relatively little training. Highly competent secretaries, managers, and shop managers are easily frustrated with new technology that they are unable to master quickly (Alavi 1986). They simply revert to old manual methods. Continued pressure from superiors to master the "new investment" combined with poor training creates frustration and contempt. (Stoner and Wankle 1986)

4. ADP/User Communication Gap

Prior to the advent of end-user computing and the information center, the ADP department suffered perpetually from a significant development backlog. (Perry

1987) This situation meant that the ADP professionals never had much time for doing anything but working on a job that was always behind schedule. They did not have time for the creative activity for which they were hired, promulgating a negative image of patronizing and uncommunicative individuals.

The information center has provided an opportunity for increased interaction with users, generally providing immediate feedback to user queries. This is made possible by the nature of the information center's role of "advisor vs doer" (O'Connell 1988). It is better for the user to actually accomplish the task than for someone else to do it for them. The user finally has someplace to go to ask their questions and expect immediate concern and guidance on the issue.

This has created an environment where users can expect and receive support. Users are now changing their views upon how they look at data services in general. Today nearly seventy percent of users polled say that they have a higher regard for the data processing function in their organization. (CRWTH 1987)

5. Quality of Information

The advent of end-user computing and information centers has evoked increased support for databases. These databases provide the corporation with data that may be shared and accessed by users throughout the organization. Manual searches for information are significantly reduced by making data readily available to users, generating increases in productivity. Increases in productivity generated by well-administered databases create support for database formulation and maintenance, thereby providing the organization with better information for the decision making process. (Carr 1987)

Data integrity problems within the organization should be reduced by the use of larger corporate databases which, in turn, significantly reduces the need for individual department databases. Reducing the number of files maintained decreases the opportunity for conflicting information within the organization, increases data integrity, and effectively reduces the opportunity for poorly informed decisions. (Kroenke and Dolan 1988)

Another source of unproductive time for employees is data entry. Databases reduce the need for continued re-entry of data into individual files. Additionally, fewer errors are made through excessive entry and re-entry of data used by multiple departments within the organization.

In summary, end-user computing has made it more profitable to develop corporate databases. This is made possible by providing more people with ready access to appropriate, timely information that may be used to produce higher quality information for decision making.

C. ISSUES FACING CONTEMPORARY INFORMATION CENTERS

It has been said that one of the greatest innovations in data processing in the late 1980's was the advent of end-user computing. Today, nearly eighty percent of all large firms in the United States have information centers that are responsible for establishing objectives for the management of this resource (Wolman 1988). A review of the literature on the subject of information centers and end-user computing revealed the following issues of interest to those studying and managing these areas.

1. Management Support

Management support of the information center concept and of end-user computing in general, is one of the most critical elements in the successful deployment of these two valuable resources. The degree of top-level management support dictates the level of success of the information center and subsequently of individual computing within the organization. (CRWTH 1987, AMA 1986)

In the past, upper echelons of management have left the issues of information and automation to the ADP department. Today, the significance of managing the corporate information resource is well documented. End-user resistance to computers in the work place has dropped from forty-six percent of those polled in 1985 to less than seven percent in 1987. However, management resistance has dropped less significantly, from twenty-five percent in 1985 to eighteen percent in 1987. These figures point to the fact that employees today are now comfortable with the electronic workstation. However, management resistance still lingers due to the inability of some corporate staffs to effectively justify the resources spent by the information center and its clients. (CRWTH 1987)

2. Staffing

The staffing issue is one of the most common problems faced by today's information centers. There are several special characteristics that information center personnel must possess to effectively develop the positive image of the information

center in the user community. Several critical traits have been identified through surveys of successful information centers. (Perry 1987)

- Interpersonal communication skills
- Initiative: ability to be a self starter
- Leadership / organizational skills
- Teaching ability
- Problem-solving skills
- Application expertise
- Product knowledge
- Knowledge of the organization
- Marketing skills
- Ability to relate to users
- Enthusiasm

Three staffing issues are discussed in further detail: (1) information center managers, (2) staff requirements, and (3) trainers. Most information centers begin with a relatively small staff. The quality of the manager and staff chosen initially may well determine the fate of a budding information center.

Information center managers should be self-starters that can get the job done with little or no guidance. They should have some data processing background but more importantly they must be able to address technical issues in a manner that is neither imposing, nor critical of users and management. The most important part of their job will be the ability to communicate with a wide variety of leaders in the organization and sell them on their concept of how the organization needs to manage and control individual computing. They must be the champion of the concept, and should be unbridled by other non-information center responsibilities. (Carr 1988)

The size and qualifications of the information center staff will be a function of top management support. The growth potential of the information center and personal computing within the organization is limited by the quality and quantity of staff provided to the information center manager. Surveys conducted by the CRWTH Corporation (1985, 1987) and the American Management Association (1984, 1986) on information center issues identifies quantity and quality of staff members as a principal limiting factor in the successful accomplishment of their mission. Figure 2-1 provides a guide developed by Carr (1988) to standardize the number of specific staff types that should be provided in an average information center.

Carr's guide represents one of the first attempts to standardizes staffing requirements for information center implementations. Therefore most of the information centers in existence today do not comply with these specifications (CRWTH 1987). Innovative managers with less than optimal numbers of trained personnel are overcoming this problem in a variety of ways. One of these methods is the use of "super-users" that are trained by the information center, and act as a liaison between the information center and a particular department. Their purpose is to provide a link between the department users and the information center. This reduces the load on the information center while solving the users' problems. Another solution to this situation is the use of computer based training, which is discussed in more detail in section C-2-a.

Number of Information Center Staff Members Required

User Type	Phase of Information Center	Number of Staff per 100 Users			Product Specialists	Departmental Specialists
		Consultants	Specialists	Use		
Technical	Just Starting	3	1		2	
	Moderate Mature	1	2		3	
	Stable information center	1	2	Use	3	
Non-Technical	Just Starting	6	.2		1	
	Moderate Mature	5	.5		1	
	Stable information center	4	0	Use	1	
Management	Just Starting	6	0		0	
	Moderate Mature	6	1		0	
	Stable information center	5	1	Use	0	
Highly Varied	Just Starting	6	0		1	
	Moderate Mature	5	.5		2	
	Stable information center	4	1	Use	2	

Figure 2-1
Information Center Staffing Guidance

3. Hardware Support

Hardware support takes the form of procurement, maintenance, and training in a wide variety of computer components. These components range from large dollar items such as computer systems (mainframe, mini, or micro-computers) to less expensive, yet important "add-ons" such as modems, network boards, and other miscellaneous hardware devices. The thread linking all of these devices is compatibility. Compatibility refers to the ability of one device to be successfully used in conjunction with another in a single system. Compatibility is critical to the success of any large organization's automation environment. The selection of the wrong brand of equipment may result in one system not being able to "talk" to another system. This problem may paralyze the organization's ability to operate efficiently. Therefore, the issue of compatibility is of major concern to the organization.

The acquisition of mini and micro-computers has grown significantly during the life cycle of the information center (AMA 1986). Seemingly by default, the supervision of this acquisition activity is evolving as an information center activity (O'Connell 1988, CRWTH 1987). Information center approval may be required prior to the acquisition of computer hardware, thereby providing a centralized method of ensuring compatibility throughout the organization. Mainframe acquisition has always been controlled in this manner, and will probably continue to be managed by the ADP department.

Having established the standards for hardware, the information center may also be responsible for coordinating with mainframe managers for end-user

connectivity standards. Defining these policies establishes controls and standards that facilitate interaction of users with the mainframe databases from their electronic work station.

4. Software Support

Software support is probably the most important function of the information center. Virtually everything the staff handles on a daily basis involves informing the user about the capabilities and limitations of computer software. This task is complicated by the fact that software developers are releasing a wider variety of software products faster than ever before (Perry 1987). This phenomenon combined with the issue of a limited staff may require the information center to restrict the range of software products that it supports.

Initially, this task was relatively simple. Users were novices with regard to their level of computer literacy and the applications they developed were very limited. Today however, most organizations are beginning to experience ever increasing levels of employee automation skills. Eighty percent of today's information centers support mainframe computing, providing training and guidance on an average of ten computer programming applications. Additionally, they maintain their traditional role of supporting micro-computer software, with most supporting twelve or more software products. (CRWTH 1987)

The constantly growing spectrum of mainframe products supported by the information center seems to verify the upward trend in end-user computer literacy (CRWTH 1987). It can be argued that software support is no easy task. Traditional information center management theories dictate that products supported should be

limited in number, rejecting queries about unsponsored products. This is obviously a very sensitive issue, one that should not be treated lightly. The information center staff must maintain contact with its clients to ensure that it is supporting the products that the users desire. Failure to do so will create the same roadblocks that computer users experienced prior to the wide-spread use of end-user computing (unresponsive ADP departments slowing the productivity of creative employees). (Karten 1987)

5. Privacy and Security

Security and privacy are critical to the continued success of computing at virtually any level. These two issues determine who is authorized to manipulate the data stored in the computer. Both should be of great concern to every computer user. Unfortunately, many computer users are indifferent about these issues until a disaster has occurred, and then it is usually too late.

Privacy violations involve the unauthorized access to personal information by people other than those for whom the information is intended. (Panko 1988) Privacy issues are becoming of greater importance due to the growing number of databases in use throughout the United States. Additionally, there seems to be a growing trend to prosecute corporations that illegally distribute private information on individuals. (Panko 1988)

The role of the information center in training users on privacy and security issues has been very limited. Generally, information centers fail to train users in privacy issues, relegating the duty of training individuals to the responsible departmental managers (Hsiao 1979). However, there appears to be a growing need

for training regarding the Privacy Act of 1974. Lawsuits posed by employees, suppliers, and customers are combining to make privacy an issue of increasing concern to top management, and therefore a matter of interest for the information center staff. (Panko 1988)

Security issues center around the ability of the organization to properly protect the accuracy and access to its corporate information assets (Panko 1988). Security concerns a wide variety of topics including physical security, hardware and software (operating system) security, and database security. This discussion focuses more on database security because physical security and hardware and software security are issues controlled less by the end-user than by the organization. (Hsiao 1979)

As identified earlier, one of the goals of many information centers and end-user groups today is to allow access to corporate databases by many different users across multiple departments in the organization (CRWTH 1987). Accomplishing this goal eliminates data duplication and needless data re-entry. Ultimately, achieving this goal may increase the level of integrity (quality/accuracy) of data throughout the organization. However, this opportunity does not arise without a price.

Procedural and management controls may be used to regulate database security and privacy issues. However, a balance between controls and access must be achieved. Controlling end-user computing involves the management of people performing unstructured tasks (Goldberg 1986). This requires the imposition of authority and control, without significantly stifling innovation.

The issues of control and security center inevitably around corporate power. Allowing access to the corporate database is a direct assault upon the power base of the data processing department. This group of people has controlled the corporate data for nearly four decades. Prior to the advent of end-user computing, ADP personnel were always involved when management needed information from the organizations computer files. End-user computing broke the monopoly ADP had on corporate information assets.

The concerns expressed above, combined with a genuine need for verification of data accuracy prior to entry into the corporate database, converge to a need for new management, training guidance, and control methods. Furthermore, connectivity to the corporate database dictates changes in the methods of control and access to data within the organization. (Hsiao 1979)

The database issues identified during this discussion may be successfully administered through an effective link between the Information Center Manager and the Corporate Database Administrator (DBA). Access to stored data requires that users know that the data exists, its location, its owner, and methods of access. (Carr 1988) The DBA can provide all of this information to users with a need for specific data through the information center. Additionally, the DBA may coordinate the extraction of this data by the user and subsequent access on the user's own terms. Users should not be permitted to upload data that was retrieved prior to the DBA's consent. None of the issues discussed above are insurmountable. However, the issues of access and control must be addressed and managed correctly in order for the organization to accommodate the process of change with minimal discomfort.

6. Promotion of the Information Center

Marketing the information center is one of the top issues presented at information center conferences as well as the subject of many trade publications. Frequently, marketing the information center involves solicitation of top management support. This request for support often centers upon promoting the quantitative returns on investment generated by the information center (Perry 1987). This requires detailed accounting of cost savings accrued by information center clients, and the maintenance of a constantly growing catalog of intangible benefits cited by users.

While these methods are definitely necessary to secure funding and continued support, care must be taken to avoid over-committing. Promotion of services that the information center either cannot deliver or may not be able to continuously support is most assuredly a path to disaster (Carr, 1988). The information center manager must always be cautious to provide only those services that the center can support in a professional manner. The image of complete competence must always prevail. The information center is a service-oriented department that will be successful only if the service provided is competent and professional.

7. Training

The training of users is another important activity provided by the information center staff. Direct consultation combined with classroom instruction, provides users with the tools necessary for productive operation of the software and hardware provided (Carr 1988). There are a wide variety of techniques being

employed by information centers today in the performance of this task. Rather than commenting upon all the various techniques currently in use, we focus upon the most significant productivity enhancement in training being used today, followed by a short discussion on training costs.

The shortage of personnel in virtually all information centers has dictated the need for automation of the more labor intensive tasks provided by the information center. CRWTH (1987) found that information center managers viewed Computer Based Training (CBT) as the most innovative technique for increasing the productivity of the information center staff. This technique delivers interactive instruction to students, at times and locations of their choice. These options provide clerical personnel, supervisors, and top-level managers the convenience of attending formal classes without rigid meeting times. Figure 2-2 provides the response rates on a wide range of benefits associated with CBT. (CRWTH 1987)

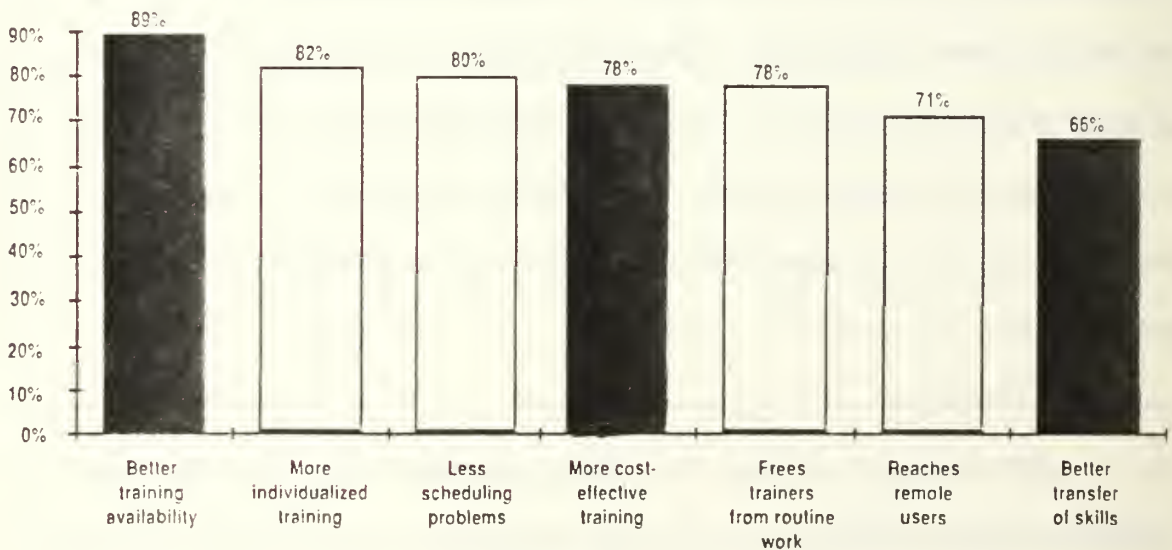


Figure 2-2
Results of 1987 CRWTH Survey On CBT

The 1987 CRWTH and 1986 AMA surveys on information centers indicated that CBT improved training availability and individualized training while decreasing scheduling problems (CRWTH 1987, AMA 1986). Research conducted by the Information Systems Networks corporation in 1987 indicates that the real power of CBT lies in its ability to provide interactive training and simulation that is actually more comprehensive than normal classroom instruction (O'Connell 1988). The XEROX Corporation recently reported that their students learn seventy percent faster with computer based instruction than with the more traditional passive instruction. (CRWTH 1987)

The economic benefits of Computer Based Training may prove to warrant further commitments. The reduction in training time should provide a second valuable return on this investment. Not only are students learning faster and transferring their skills more smoothly, they are being removed from productivity for a shorter period of time. CBT maximizes the information center staff's time by allowing them to interact with those individuals who really need the training rather than preparing for classroom instruction.

Computer training must be examined from the perspective of cost and productivity. The ability of the information center staff to quantify the return on investment through cost/ productivity ratios may determine increases and decreases in the training budget. Failure to present the positive impact of end-user training in corporate terms may lead to reduced funding (Nolan 1979). This situation occurs because some executives fail to realize that with the use of technology comes the requirement for trained personnel. Failure to train personnel properly will result in

additional costs generated through the loss of valuable corporate data, or worse yet through the inaccurate manipulation of information (Wolman 1988). The results may be the loss of millions of dollars due to decisions made from poor data.

The costs of poorly trained personnel go beyond the above issues. If personnel are not provided training by the organization, they may get it informally from other sources. These sources may be individual experimentation or asking a colleague. Either of these techniques reduces productivity because the employee is not involved in accomplishing the task they were hired to perform. Additionally, users may get bad information on how to solve their problem, resulting in application errors that are insidious and difficult to detect.

This type of error is the most costly because the error shows up unexpectedly. The result is a very costly judgement error caused by poor programming or data integrity problems. An example of this type of situation would be the user that develops a basic macro command to sum expenditures in a local supply office. Misinterpreting the dimensional units of the columns being totalled may result in poor decisions generated by an unsuspecting commander.

This section has presented CBT as one of the most recent productivity enhancements available in user training. A detailed discussion of this topic is beyond the scope of this thesis. The underlying message is that training is critical to the successful implementation of end-user computing. The question should not be "Can we afford to train users in this subject", rather the question should be "Are we willing to accept the consequences of failing to train our personnel ?" (Wolman, 1988)

D. THE FUTURE OF INFORMATION CENTERS IN INDUSTRY

There is a wide variety of views regarding the methods for evaluating the future of the corporate information center. The information industry operates in a short-lived, technology-directed environment that is driven by the effects of computer literacy and information systems management issues. (Gunton 1988)

The future of the information center is dependent upon its ability to grow with the corporation, providing more productive employees that are able to access accurate information in a more expedient manner. In doing so, the organization supported by the information center will begin to develop a strategic advantage over firms that do not train their personnel in end-user technologies. Previous studies indicate that the following areas will contribute to the fruition and success of end-user computing and information centers: (Carr 1987, CRWTH 1987, AMA 1986, Perry 1987, Rockart et. al. 1983)

- Reorganization of the data processing function,
- Establishing the information center as a profit center,
- Developing the information center staff,
- Shaping technology to changing corporate needs,
- Integrating change theory into organizational plans, and
- Developing training programs that meet end-user requirements.

1. Reorganization of the Data Processing Function

Data services within the organization often began as a minor sub-service of the Accounting department. The value of information and data services has

propelled information management (formerly data services) into the heart of the organization. Today, virtually all large organizations have elevated the corporate data processing function to a vice-presidential position that reports directly to the president of the corporation. (AMA 1986)

The customer service function within the DP department started in much the same way. The advent of end-user computing has highlighted the need for a coherent plan for supporting and developing this rapidly growing corporate resource. The information center has been recognized as the means for achieving this goal. The growing importance of support, guidance, and control of end-user computing will could result in the restructuring of the data processing function within the organization. (Atre 1986)

An example of such a reorganization is provided in Figure 2-3, which indicates a separation of the formal Management Information System (MIS) application development function and Information Center Services. A new function has been established for the management of end-user services that is on the same level as MIS development and Corporate Data Processing Services and Operations. The significance of this reorganization lies in the removal of the information center from the control of MIS development. This will provide the information center with increased visibility and support within the organization. (Carr 1988)

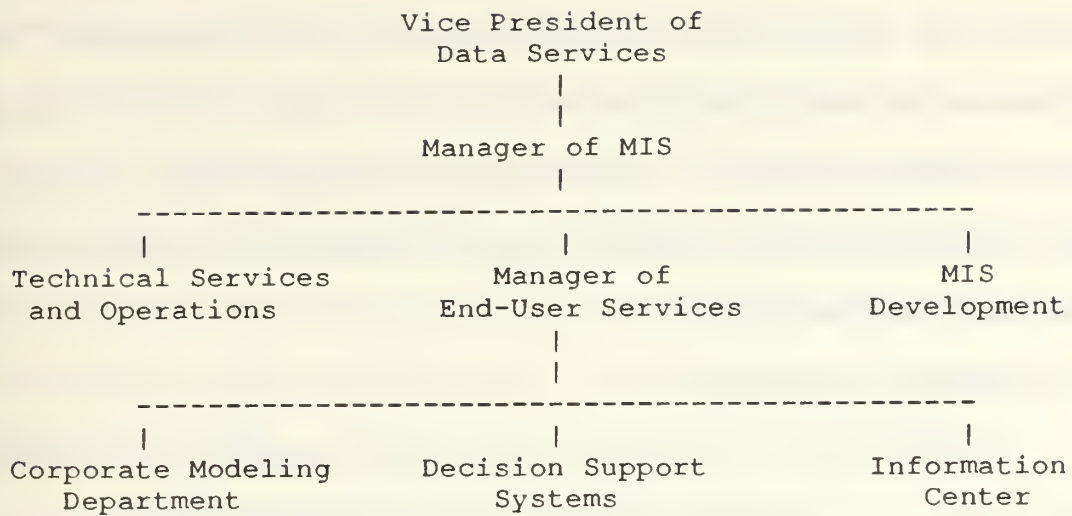


Figure 2-3
Organization of the Data Services Function

2. Establishing the Information Center as a Profit Organization

Many information centers were founded in order to control and guide the acquisition of micro-computers by organizations. Today, nearly seventy percent of the managers supervising information centers founded between 1981 and 1985 indicate that they have accomplished their original goals¹ and are ready to move on (CRWTH 1987). This is the moment of truth for many of these organizations; they will either be able to establish themselves as a major force in the organization, or they will be absorbed into the departments from which they came (Kelleher 1986).

Tomorrow's information center must become involved with the larger issue of developing strategic information management techniques for end-users. The

¹ Training users in basic computer skills seemed to be a common theme. CRWTH (1987) provides evidence that basic skill training requests are diminishing, and being replaced by requests for mainframe access and applications programming.

information center Manager must prove the worth of the information center and develop a new platform that will generate support from top management. This platform must be based in profit generated by the information center. This task will require the information center to support products providing strategic advantage in support of the organization's mission as opposed to products that concentrate simply on individual employee efficiency.

3. Staffing Requirements

Staffing issues will continue to be of critical importance to the success of the information center. Two concerns appear to be most significant in information center personnel management; (1) staff composition and, (2) establishment of accepted career paths (CRWTH 1987). The issue of staff size is also important, but it appears to be one that will continue to be an unsolved problem for the information center (Wolman 1988).

Staff composition is critical for maintaining the proper level of support needed by information center clients. The specifics of this issue are discussed in the next chapter in conjunction with information center and end-user growth stages. Briefly however, the technical capability of the information center staffs must continually change with the level of computer literacy within the organization. As users begin to develop more advanced applications, the staff will need to employ more analysts and programmers. Eventually, the information center may become more of an information brokerage department, providing technical assistance as well as customer system consultation. (Euske and Dolk 1988)

Development of career paths for information center personnel is quickly becoming a major issue. Career paths must be developed by management that provide for upward mobility of outstanding personnel. Currently, there appears to be a void in well-defined career paths available to information center personnel. Lucrative career development patterns for information center professionals must be developed to attract the best people in the data services department. If this fails to materialize, the brightest personnel will not be interested in information center positions. (Atre 1987)

4. Shaping Technology to Fit the Needs of the Organization

Integration of individual products into a larger overall scheme will become of critical importance to the organization in the future. The organization of software products into a contiguous support package that does not inhibit the creative nature of end-user computing is one of the greatest challenges in the future of information centers. (Gunton 1988)

5. Integrating Change Management Procedures

The challenge of change lies in the ability of an organization to adapt, introducing the changes desired by its leaders in a manner that provides relatively minor discomfort to all concerned. All too often however, the change process is confusing, filled with stress, inconsistency, and conflict (Stoner and Wankle 1986).

Traditionally, decisions regarding automation technology have been made after problems began to surface, resulting in costly fiscal and human expenditures (GSA 1983). Reversing this trend will require proactive measures in planning and introducing such technology. Making early decisions regarding new technologies

may eliminate the destructive forces often encountered as part of technological change. The information center provides an excellent option for accomplishing such a task.

A major obstacle to the implementation of new policies, goals, and methods of operation is the resistance of change by organizational members. Stoner and Wankle (1986) developed three sources of change resistance as follows:

1. Uncertainty about the causes and effects of change. Organization members may resist change because they fear losing their jobs and colleagues. Even though they may be dissatisfied with their current situation, they may still feel that things will get worse with the proposed change.
2. Unwillingness to forfeit existing benefits. Proposed changes may benefit the organization as a whole but the individual may suffer.
3. Awareness of weaknesses in the proposed changes. If potential problems are recognized by organization members they may be unwilling to implement them. This is especially true if the problems are not addressed by their superiors and those initiating the changes. (Stoner and Wankle 1986)

The fears depicted above are often heightened when technological innovations are accompanied by organizational change (Lawrence 1969). The cumulative effects of these two forces may be experienced by end-users within the organization as well as ADP/MIS professionals. A goal for the future should be to reduce these tensions through effective communication of the strategic goals for end-user computing within the organization. Accomplishing this task will serve to eliminate tension by reducing apprehension about the future (Kotter and Schlesinger 1979).

6. Future Training Requirements

It has been estimated that by the year 1990, nearly 75 percent of all computing will be accomplished by end-users (Goldberg 1986). This growth accompanied by increases in basic computer skills should generate a change in focus for information center training activities. It appears that information center's will remove themselves from production line training programs and center more upon supporting the development of more sophisticated product applications. This task can be accomplished through extensive use of Computer Based Training.

The results of numerous studies (Guimares 1984, Wetherbe and Leitheiser 1985, Gunton 1988, Rivard and Huff, Cougar 1986) indicate that there are several specific areas that will need support from the information center of the future. Training in these areas will be requested by average end-users in the pursuit of their daily tasks, requiring significant information center support. The areas showing increased frequency of requests by information centers polled in 1987 are provided below:

- Requirements analysis
- Structured programming techniques
- Management training
- Connectivity Procedures (Organization and industry mainframe connections through local and wide area networks)
- Integrated office systems (desktop publishing, word processing, spreadsheet, graphics, and databases). (CRWTH 1987)

E. SUMMARY

The information center is subject to the same organizational dynamics as any other functional unit. Its leaders may suffer from a lack of a clear understanding of

the organizational role and mission. The information center may be crippled by a lack of resources and personnel, as well as its goals being in constant conflict with the rest of the traditional data processing function. However, one aspect of the situation is very clear; properly implemented, the information center can be as vital as any department in the organization.

This chapter has dealt with the information center concept, its origins, its organization, current critical issues, and its future. The implementation of the concept is as varied as the organizations in which it is found. The key to its continued success is the utilization of corporate planning and management control measures. These issues are discussed in detail following a discussion of US Army information center development.

III. MANAGING THE EVOLUTION OF END-USER COMPUTING

A. BACKGROUND

The rapid development of technologies evolving to support the end-user computing environment provides significant challenges requiring the attention of military leaders (Harris 1988). The procurement of these technologies is thriving. In most cases procurement has preceded the development of appropriate policies and guidelines for the implementation and management of the new equipment (GSA 1983). The development of management expertise in the areas of planning and control of end-user computing and associated automated office activities is just beginning to filter into the offices of policy and planning (Craven 1988).

The choice seems clear. We can either define our future equipment and resulting staffing needs or we can be continually driven by the proliferation of "new and improved" hardware and software technologies. Failing to define future personnel and equipment needs in end-user computing will require leaders at all levels to continually adapt to new technology, promoting an endless change process. This does not appear to be an optimal situation.

This chapter defines the link between end-user maturity and the information center mission, providing an analysis of how the two affect each other. The concluding sections yield a discussion of control strategies and their link to strategic planning.

B. THE MANAGEMENT OF END-USER COMPUTING

The prominence of end-user computing has risen rapidly in government agencies and civilian organizations. Today, end-user computing constitutes 50-60 percent of the total processing done in major companies and it is estimated that by 1990 this figure will exceed 75 percent (Benson 1983). These figures indicate that end-user activities are likely to be the dominant form of computing in the immediate future (GSA 1983). Micro-computer technology has fueled the end-user revolution and the subsequent rush to procure the latest and the best technology.

The balance between control and innovation is critical to the success of end-user computing, and more importantly, the success of today's information oriented organizations. Controls help to focus impending change, yet used excessively, they can stifle innovation (Stoner and Wankle 1986). Henderson and Treacy provide insight into the management of end-user computing with the following observations:

... As a result of this rapid growth, end-user managers are confronted by difficult management questions. The challenge for information systems managers today is to satisfy the demands of end-users while advancing an EUC strategy that will efficiently support the competitive advantage of the firm. In other words, IS managers are being called upon to strike a balance between end-user demands and an appropriate strategy that is somewhere between tight controls and laissez-faire. (Henderson and Treacy 1986, p. 4)

The early years of end-user computing in the Army seemed to be more reactive and oriented toward "crisis management" (GSA 1983). Today however, this situation is changing. Army leaders are beginning to understand the capabilities and limitations of modern computers as well as those of the users themselves. We are now seeing the need for the development of management strategies that focus on

the automated workstation environment (Craven 1988). Effective strategies provide the user community with a direction to focus their efforts, effectively providing a goal to which they can aspire.

Army data processing departments manage their equipment, data, and access procedures in great detail. Throughout the Army, computer centers have extensive standard operating policies, intended to ensure control over the procurement and use of computer systems and the integrity of the data they store.

The technologies used by end-users must be managed somewhat differently than these large, complex, and costly ADP systems (GSA 1983). The need for control in the end-user computing environment is not clear in all organizations, however. A recent study indicates that 70% of end-users perceive the lack of a coherent plan for personal computing in the organization (Guimaraes 1986).

Plans give purpose and direction to the organization. Controls ensure that actions taken by the organization's employees support the plans set forth by management. The planning and control mechanisms developed by management provide employees with the opportunity to determine appropriate behavior and performance standards. The definition of these standards of behavior and achievement potentially reduces the level of stress in the work environment. The ability for employees/soldiers to interpret the "rules" and develop behavior to support organizational goals is critical to the overall success of the organization. (Stoner and Wankle 1986)

C. A NEED FOR CONTROL

Successful information systems departments use end-user computing as a complement to the centralized data processing department. The challenge for these innovative departments is to channel end-user activity such that it complements the mainstream of data processing (Gunton 1988). The advantage of this approach is that both parties benefit and exist in a single organization, one supporting the other.

Establishing this synergy implies that both factions exist to enable the accomplishment of organizational goals. Controls exist to provide reinforcement of standards established to achieve these goals. Dalton (1971) argues that control requires that standards be established in an effort to compare performance to the goals of the organization. This procedure occurs either on a discrete or continuous basis and requires corrective action when the comparison reveals performance at levels below the established standard. Controls sustain performance when management control systems are employed in this mutually supportive process. (Euske 1984)

The specific reasons for controlling end-user computing are diverse. However, several important observations have been identified over the past few years. Uncontrolled personal computing can serve to undermine the corporate MIS planning process, creating dual procurement and development processes. The combination of aggressive, sophisticated end-users with a weak MIS department may open the door to unnecessary conflict within the organization. The conflict may serve to confuse information management issues in the eyes of senior executives, generating a loss of confidence in both parties. Therefore, the need for a single goal, accepted by both

factions, is paramount to the continued success of both the organization and the combined computing efforts of the organization. (Kolodziej 1987)

A model developed by Henderson and Treacy (1986) concisely summarizes areas in the greatest need of controls. The authors define four fundamental issues that leaders need to address when developing a control strategy for end-user computing.

Support Infrastructure: This issue concerns the mechanisms for educating, implementing, and leading end-users. Rockart and Flannery (1983) classified end users into six groups.¹ No one of these six groups has the same needs as the other. It becomes self-evident that designing an organization that can support all of these groups is nearly impossible. Providing a centralized support facility for the organization may not address the needs of all types of users, and may be of only secondary importance to informal support groups.

Data Infrastructure: Issues of data standards, subject databases and security are dealt with here. The productivity of end users is also linked to the availability of the data. Currently, less than ten percent of the data used by end-users is obtained directly from larger database systems. (Quillard, Rockart, Wilde 1984)

Technological Infrastructure: This includes issues of hardware, software, and communications devices to support the automated office. Standards are a major issue with regard to compatibility and shared data. The tradeoff here is that by imposing standards that are too stringent, we may force the use of equipment that is not best suited for the job.

Evaluation/Justification and Planning: The economic justification and evaluation of end-user computing is crucial in the days of critically reduced funding. Subsequently, the information center must be able to justify its existence through cost-benefit analysis. The ability of the information center to impress top management with the impact of end-user computing and itself rests with its ability to generate these figures.

¹ Rockart and Flannery's model defining levels of computer literacy is discussed in more detail later in this chapter.

The issues identified by Henderson and Treacy are often addressed by theories of the management of end-user computing. The following provides a discussion of control theories for end-user computing. These models are presented in a sequential manner. Initially, models which describe pervasive operating environments facing information managers of the future are introduced. Next, theories relating to the development of end-user computer literacy are presented. The discussion concludes with a method for managing the integration of new technology into the organization.

D. SELECTING AN OVERALL OPERATING ENVIRONMENT

Selecting a strategic objective for the environment in which the organization wants to operate serves as the topic for Euske and Dolk's (1988) analysis of management control strategies for end-user computing. They focus upon control strategies for the overall operation of the entire organization (Euske and Dolk 1988). Their three model theory is based on the premise that end-user computing requires a more pervasive management strategy, one that encompasses the entire organization.

Three environments are identified by the authors: (1) Bureaucratic, (2) Norm-Based, (3) and Virtual Market. The Bureaucratic environment emphasizes formal controls based upon an extensive set of rules established by the organization. The norms for the organization are established through a comprehensive understanding of regulations established to provide specific guidance for selected situations. This environment is perceived as a steady state, where the user is assumed to have minimal knowledge.

The Norm-Based model assumes an environment in which users have attained a high level of user knowledge about the automation environment. The majority of

users throughout the organization are characterized as growing in computer literacy. Users possess some understanding of the need for compatibility, integrity, and quality of information resources. The controls in this model are informal as opposed to formal in the Bureaucratic model. Rules may not be written down or officially approved by the organization. This model is seen as a transition state between the Bureaucratic and Virtual-Market environments.

The Virtual Market model assumes a more advanced level of user skills identified by the authors as "power users" or "local experts". The users in this market do not need controls or guidance regarding the proper use of automation products because they are conversant in the capabilities and limitations of automation tools offered by the organization. The organizational focus is based on increased user productivity with technology serving only as a tool to develop increased output (Euske and Dolk 1988). Figure 3-1 provides a comparison of the three environments in terms of user awareness, information center activities, DP planning and control activities, and applications portfolio.

Euske and Dolk argue that increased end-user computing forces an organization into a Norm-Based environment, which is then followed by movement into a more steady state such as the Bureaucratic or Virtual-Market condition. This move has can be influenced by the leaders of the organization through conscious decisions to increase bureaucratic controls or to establish broad overreaching objectives for operation in the Virtual-Market.

The costs of operating in each of the environments described by Euske and Dolk center on costs to the organization. Operation in the Bureaucratic environment will require training users to comply with rules established by the organization's

leaders. Costs related to this type of training would include training on specific software packages supported by the organizational hierarchy.

	Bureaucracy	Norms	Virtual Market
User Awareness	Minimal Knowledge	Computer Literacy	Marketwise
Information Center	Computer Center Like	Service Center	Broker
DP Planning & Control	Centralized	- Descriptor - Informal	- Efficiency Monitor - Output
Applications Portfolio	Functional	DSS	Generalized

Figure 3-1
Euske and Dolk's End-user Evolutionary Models

Education costs in the Virtual-Market environment focus on the ability to gain access to data generated in different parts of the organization. The data that is being accessed may have been stored in one format and retrieved by a system requiring a different format. An example of costs encountered in this environment would be the development of macros that can import applications developed in one software package into that of another. These macros eliminate the need for limiting the use of specific software and hardware products. Users are permitted to use the product

of choice, increasing creative freedom. Figure 3-2 shows how the different environments affect compatibility, integrity, and quality considerations throughout the organization.

Compatibility	1	2	3
Integrity	1	2	1
Quality	2	3	1
	Bureaucracy	Norm	Virtual Market

Figure 3-2
The Effects of Operating Environment
(Dolk and Euske Model)

The model further suggests that selecting one environment over another also involves accepting tradeoffs in compatibility, integrity, and quality of user developed applications. Compatibility is highest in a Bureaucratic environment because the organization can control all software and hardware purchased by the organization. Integrity is higher in Bureaucratic and Virtual-Market environments than in the Norm-Based model since the latter is characterized by a lack of knowledge combined with a lack of formal rules to guide operations. Quality is highest in a

Virtual-Market because users operate with the equipment that they are most familiar rather than with the products prescribed by the organization.

This strategically oriented theory has several implications for information center management. Senior leaders within an organization must determine the end-user environment in which they want the organization to operate. In making this decision, they acknowledge the acceptance of tradeoffs in a wide range of costs related to the environment selected. (Euske and Dolk 1988)

E. END-USER MATURITY AND THE INFORMATION CENTER MISSION

End-user maturity is a term that describes the level of competence and overall performance that an individual user has been able to achieve. There are many theories that discuss levels of end-user growth that also define the stages of development from computer novice to experienced programmer. Rockart and Flannery (1984) define six classes of end-users based upon computer skills, computer use, training needs, and application focus:

Non-programming end-users: Their only access to computer-stored data is through software provided by others. They neither program nor use report generators. Access to computerized data is through a limited, menu-driven environment or a strictly followed set of procedures.

Command level users: Those who have a need to access data on their own terms are members of this group. They perform simple inquiries and calculations and generate reports as needed. They understand the databases available and can specify, access, and manipulate information. They are willing to learn just enough about the software to accomplish their day-to-day tasks.

End-user programmers: Users that develop their own applications comprise this category. They develop programs for personal use that may be passed about the organization later. These personnel are local experts, providing information on limited areas of expertise.

Functional support personnel: Users in this group are sophisticated programmers who support other end-users within their particular functional areas. These personnel have become informal information centers themselves, providing advice on a wide range of applications, sometimes referred to as "Power Users" (Munro, Huff, and Moore 1987). They provide the majority of the code produced within their organization.

End-user computing support personnel: Personnel similar to those in the information center comprise this classification. Roles vary from organization to organization. Fluent in a wide range of application packages.

DP Programmers: Personnel in this category are similar to structured programmers that are employed in the traditional data processing function except they program in fourth generation languages for end-user activities. (Rockart and Flannery 1983)

Although stages of maturity have been defined by Rockart and Flannery, relatively little work has been done with regard to defining the manner of growth from one stage to another. The issue is further complicated by the lack of an accepted framework for the planning and management of the same growth.

Munro, Huff, and Martin (1988) propose a model based on traditional management information theory. However, like Euske and Dolk's model, their model is descriptive in nature, designed to provide a comprehensive understanding of the work environments of end-users and their managers. The model provides a window through which end-user development may be observed and analyzed. The five stage model may also provide a link between the orientation of the information center and the level of maturity of its clients.

Stage 1: Isolation

Encompasses all early end-user computing activities. The organization has a Laissez-faire management approach in that they have made no serious attempt to support the end-user computing activities. Number of users is small. Planning, control, and support for end-user computing is largely unavailable. The key event that enables the transition from Stage 1 to Stage 2 of the model is the founding of an organization information center.

Stage 2: Stand-Alone

The information center begins to market itself, increasing end-user awareness throughout the organization. A dramatic increase in the demand for end-user computing occurs. The information center begins to plan and standardize its very basic services. The information center is staffed largely by non-specialists brought in from other parts of the organization. Typically, demand exceeds the capability of the information center.

Stage 3: Manual Integration of User Applications

IC Management begins to turn its attention away from daily operations and directs its interest more toward the organization's needs. Increased end-user computer literacy forces the need for specialists on the IC staff. The IC staff now begins to see the need for integration with the traditional data processing function, essentially the need for connectivity is driven by end-user requirements.

Stage 4: Automated Integration

The need for connectivity drives the need for corporate wide policies and management of data at all levels. End-users become more concerned with security and integrity issues. Policies are adopted that require the adoption of standard file formats and data structures. The huge wave of computer novices has now subsided. Some users become frustrated because it seems to be a roll back to pre-information center days.

Stage 5: Distributed Integration

Users have reached level three or four of the end-user growth stage model. They are very comfortable with mainframe connectivity, operating systems, and fourth generation languages. The information center staff is a strong, technically skilled, unit that has a firm grasp of the business aspects of their services. Senior executives utilize the automated workstation to communicate. The information center now has a more active role in application development. This occurs primarily because of the high level of knowledge required to accomplish the end-user tasks. End-users and the IC staff work as a team to accomplish the collective corporate mission. (Huff, Munro, and Martin 1988)

The stages of end-user maturity are based upon the applications they develop. The information center can use this five-stage model in conjunction with Rockart and Flannery's maturity levels to develop an effective strategy for supporting current client requirements. As end-users progress through the stages of computer literacy their requirements also change. This evolution dictates a need for an associated transformation in the composition and objectives of the information center staff. Therefore, planning for the development of end-users becomes critically important to maintaining continued support by the information center.

F. CONTROLLED INTEGRATION OF NEW TECHNOLOGY INTO THE ORGANIZATION

What can the organization do to control the integration of constantly evolving technology? O'Connell's model for the integration of new technology provides a mechanism for the accomplishment of this task (O'Connell 1989). This multi-dimensional model provides management with courses of action to control the number of products formally supported by the organization.

O'Connell uses control in a positive manner, permitting users to employ the technology of their choice. However, the number of products formally supported by the organization are limited. Flexibility is provided by permitting the introduction of new products by either management or end-user support groups. In both cases, the technologies are evaluated over time, allowing users to employ the product of choice. Eventually however, the product is either added to the information center's formal support list or it is officially discouraged. There are three advantages to this approach:

1. Management has the power to guide the types of new technology being integrated into the organization. This provides the opportunity to formally direct the organization toward a strategic objective.
2. Users have the opportunity to affect the types of products formally supported by the organization. This situation promotes end-user initiative, providing positive environmental controls. Users feel that they can have an effect upon the system.
3. The number of products formally supported by the organization is limited. This is a necessity to every organization with limited procurement funds. Assuming that the number of information center personnel is limited, the capacity for expert knowledge of user products is also restricted. In view of these facts, limiting the number of products supported is imperative if the information center mission is to provide expert service for end-user products.

The model is presented in Figure 3-3. The first phase of the model offers two options available to management upon the introduction of new automation technology into the environment: (1) Encourage proliferation, or (2) Contain proliferation. By encouraging the proliferation of the new technology, management outwardly promotes its support of the new product, pushing management at all levels to adopt the product. Laissez-faire controls are implemented such that interest in the product is not stifled.

Contained proliferation is used when a product has not gained the acceptance of management, yet is being introduced by the members of the organization informally. The objective of this approach is to provide "qualified support" for the new product. Management permits temporary use of the product in an effort to test its merits in improving the integrated system package.² Management support of the

² The integrated system package is discussed in Chapter II as the overall objective of shaping technology to fit the needs of the organization.

product is minimal because they either have minimal exposure or mixed reaction to the product. Eventually, the product will either be formally accepted or rejected for integration into the information center support package.

Integration of New Technology into Organization

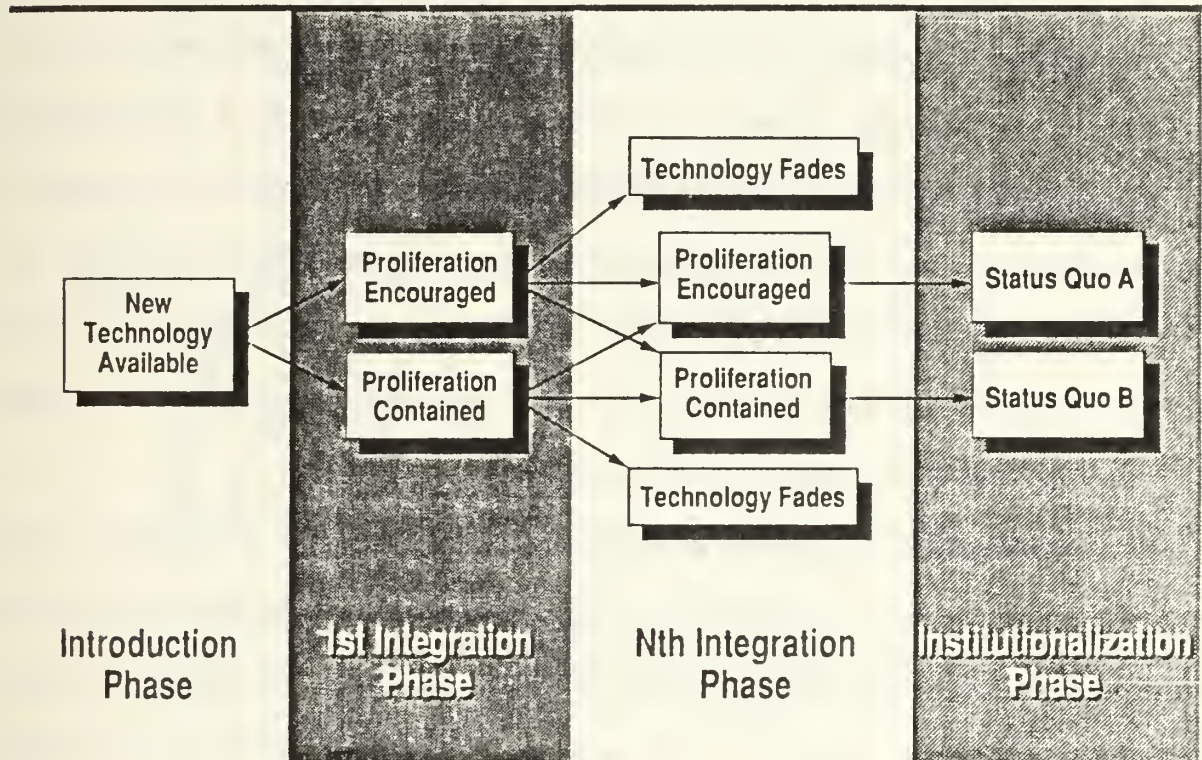


Figure 3-3
The Integration of New Automation Technology

Any number of phases may follow the first phase of technology integration. Evaluation points may be established by a steering committee responsible for establishing policies for new automation commodities. A product that started with purely encouraged proliferation may be redirected into contained proliferation,

eventually being removed from the realm of accepted corporate products. Conversely, a product introduced informally by users with contained proliferation may eventually prove its value and gain full acceptance of management.

Figure 3-4 provides an example of several technologies being managed using this technique. Technology A is provided total management support with encouraged proliferation. Technology B is encouraged initially by management and users but is found to be less than optimal in meeting organizational needs. It is subsequently discouraged, eventually fading into disuse. Technology C is initially discouraged by management, but is found to be a good product through informal end-user work groups. Eventually it is supported by management and supported for full scale encouraged proliferation. Technology D is an innovation introduced by end-users, receiving immediate support from management.

Eventually all acceptable products will enter encouraged proliferation and be adopted as a status quo commodity within the organization. Technologies that fade in support will eventually be removed from the realm of accepted corporate products. The procurement and maintenance plans regarding these new technologies may easily be integrated into the planning process based upon the support and control decisions made by the steering committee.

The information center may eventually serve as the point of entry for all new computer technology into end-user organizations. The mission of the proactive information center should include that of introducing, adapting, and training organization personnel on new technology being introduced within the organization.

Accomplishing this task includes developing control strategies that can evolve with the changing requirements of end-users within the organization.

Integration of New Technology into Organization

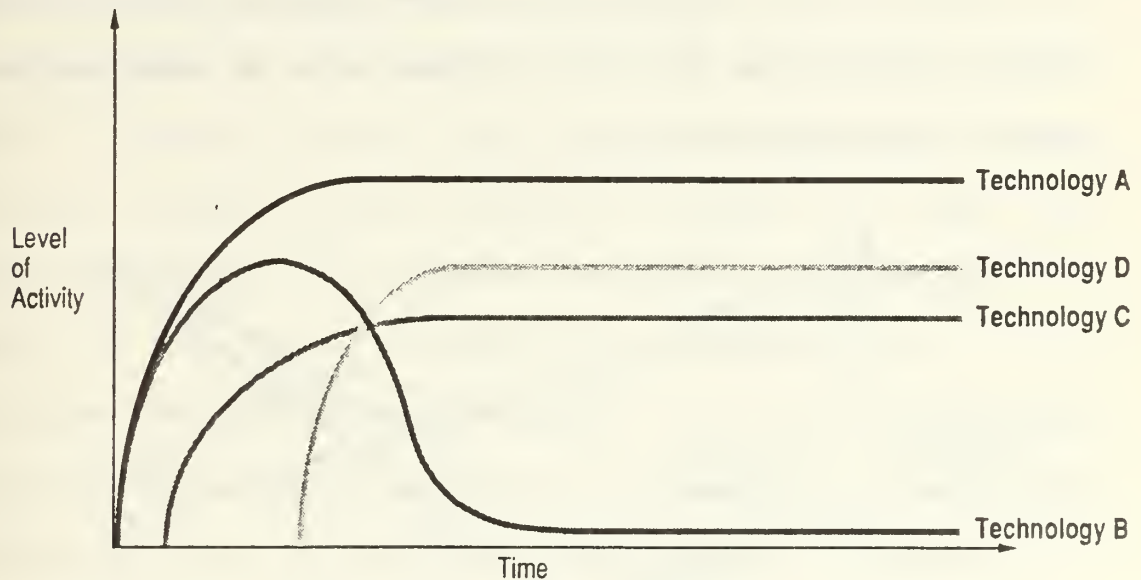


Figure 3-4
Integration of New Technology Into the Organization

G. THE EVOLUTION OF CONTROL STRATEGIES

Continuous realignment of goals is critical to the continued advancement of end-user computing within the organization. Initially, control issues are basic in nature, centering upon compatibility and skill development. Later, controls are used to address connectivity and data integrity issues. Eventually, the scope of controls will broaden to strategic issues (Huff, Munro, and Martin 1988). As emphasis areas aligned with end-user computing change, controls and the methods of enforcing

them must also evolve. These changes should be made to facilitate the accomplishment of management and organizational goals. (Munro and Huff 1985)

Henderson and Treacy's model can be used to plan a smooth transition from one growth stage to the next. The importance of each of the four issues identified in their model will vary over time as management adapts the goals and composition of the information center staff. Figure 3-5 shows how the model represents the change in emphasis over time.³

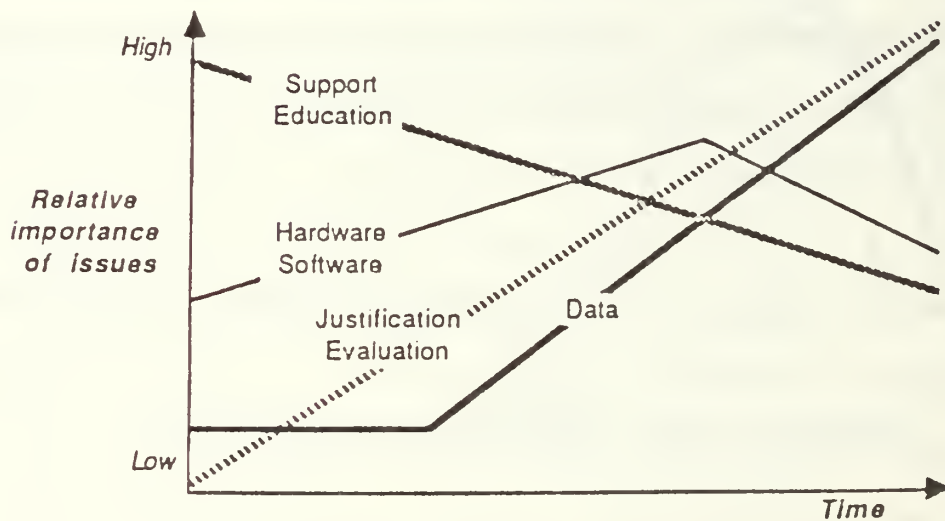


Figure 3-5
Magnitude of ADP Issues Over Time

Management must be able to determine when users are beginning to migrate from one stage to another, and to take the appropriate measures (accelerate / decelerate and adopt/drop selected controls) to attain the results they desire. Herein

³ This model is adapted from Tony Gunton, Business Information Systems: An End-User Focus.

lies the framework for the adoption of a strategic plan: Achieving maximum benefit from the investment in EUC requires the ability to recognize when users are ready for new technology and providing them with the appropriate stimuli based upon the goals of the organization.

H. STRATEGIC PLANNING: KEY TO SUCCESS

The potential for using information technology to affect the competitive position of businesses and the military highlights the importance of effective information management planning (Henderson & Sifonis 1988, Harris 1988). Unfortunately, despite the critical importance of end-user computing, an approach for planning and controlling its development has not been implemented in most organizations (Gerrity and Rockart 1986). In fact, a recent study revealed that senior management, who are typically responsible for strategic planning, tends to avoid technical issues (end-user computing) until change is inevitable. (Benson 1983)

New technology can rarely be managed successfully using a "Bottom-Up" approach (Benson 1983). Bottom-up change is predicated upon the belief that a small group of creative, well-informed individuals from lower levels in the organization can change the beliefs of an entire organization. Consequently, the theory asserts that once top management sees the effects of the innovation, they will change the organization appropriately. (Conner 1988)

The bottom-up approach does have merit, however organizational change rarely occurs entirely from the lower ranks of the organization. Information center managers have experienced this phenomenon first hand, continually trying to encourage senior management to support new technology, new operating procedures,

and the information center itself. Without such support, these managers have experienced limited success (IBM 1984).

The OD Resources Corporation, a business that provides training and consultation to organizations facing significant technological change, reports that senior management support is critical to the successful adoption of any new technology. Their 15 years of research indicates that senior executives with political and financial influence are required to legitimize the change process. However, they do report that lower and mid level leaders play a significant role in getting the changes sanctioned after support has been provided. (Conner 1988)

Gerrity and Rockart defined a new approach to managing end-user computing called the Managed Free Economy concept. This approach balances two equally important but opposing organizational needs: user requirements and organizational control. Users demand to be permitted to create, define, and develop their own applications to fulfill their information requirements. However, the need for a central authority, responsible for defining the appropriate structure of the change process, is still necessary. (Gerrity and Rockart 1986)

The US Military Planning, Programming, and Budgeting process (PPBS) provides an example of such a situation that has been proven to work satisfactorily. Fiscal and legal systems prescribe the limits within which the services must operate. Each of the services strives to accomplish their goals within the constraints imposed upon them by DoD. The overall goal is a well balanced military with each of the services being equally strong.

1. The Importance of Strategic Planning for Information Systems Management

Four significant trends in information systems management defined by Venkatraman (1986) summarize the necessity for strategic planning in information systems management. The issues he identified, combined with the limited effects of the "bottom up approach, provide a formidable rationale for the need for IS long range planning.

The first issue involves the investment generated by the constantly increasing need for information within the organization. The level of investment in the Management Information Systems function (data processing department, information center, associated services) has increased significantly over the past seven years. The general expectation is that this trend will continue, with the organization exploring the opportunities of Decision Support Systems, electronic mail, and office automation. This increase in committed resources requires systematic planning approaches to ensure that the resources are expended both efficiently and effectively. (Venkatraman 1986)

Secondly, the rapid technological change that the information systems industry continues to experience creates a very real potential for the procurement of incompatible systems (McKenney and McFarlan 1982). This situation demands a system for recognizing applicable trends in the computer environment, and subsequently incorporating them into the organization. Strategic planning provides the mechanism for forecasting future needs today, and incorporating trends in industry to satisfy those needs. (Venkatraman 1986)

Thirdly, decisions made regarding information systems today affect more functions in the organization than just the information services department. The efficient introduction of new technology into the organization requires changes that ripple through all organizational functions. Therefore, integration of the overall information systems plan with the plans of other functional areas into the overall strategic plan is critical. (Venkatraman 1986)

Finally, there is a growing belief that information systems, in general, play a significant role in today's military and business organizations (GSA 1983, Harris 1988, King 1983, Rockart and Morton 1984). King cites the use of well-designed information systems as the primary source of comparative business and national security advantages throughout the world, rather than merely a resource that can be managed efficiently like a basic production process (King 1983).

The issues presented above refer to information systems planning which incorporates the entire Management Information Systems function. The information center and its clients constitute a continually growing segment of this function, yet very little has been done to assimilate them into the planning process. As mentioned earlier, it is anticipated that in excess of 75 percent of all computing activity will be performed by end-users. The incorporation of this group into the strategic planning process must begin immediately to avoid needless waste and confusion.

2. An Approach to Information Center Strategic Planning

Collier provides an approach to IC strategic planning that appears to be broad and all encompassing. The model defines a ten step process for addressing

critical issues in successful IC planning, effectively providing senior management with a logical model for designing a long range plan. (Collier 1989)

Develop a Mission Statement: This is a concise statement describing why the IC function exists, easily understandable by the IC Staff and the clients it supports.

Define the Scope of the Plan: The personnel, business functions, and technologies, that the IC has been established to support must be defined. The scope must be specific in nature and address the issues of background and training, mission, and supported hardware and software.

Develop Strategic Objectives: Strategic objectives are statements of direction that guide the operation of the IC. Examples of strategic objectives include:

- Development of prioritized IC services that support the organizational objectives.
- Provision of proactive services to clients in high payoff areas of the organization.
- Provision of corporate wide integration of technical services.

Determine Basic IC Functions: Define the business of the IC. The objective is to clearly identify the services provided by the IC. Each function should be discreetly defined in terms of related activities. By identifying each function, planners can determine the scope of each activity and relate them to the strategic objectives previously defined.

Determine Long Range Objectives: This exercise concentrates on the unique aspects of each functional area, as compared to the strategic objectives that were defined for the entire information center. This activity should answer the questions as to the purpose and goals for each functional area.

Define Critical Success Factors for the IC: This step of the process defines the factors which must be addressed and satisfied for the IC to be successful in meeting its strategic objectives. These are the primary considerations when assigning priorities for IC resources and services.

Create A Tactical Plan For Transition: The purpose of this stage is to define a plan for getting the IC from where it is now to where it wants to be as outlined in the Strategic Plan. This plan should cover no more than a 12 month period.

- Interim objectives should be identified for each functional area of the IC. Evaluation dates should be established, and the objectives for each of the functional areas should be rated.
- Resources should be rechecked at each evaluation point, if current staffing and resource levels cannot satisfy high priority projects, additional resources should be sought. Hard decisions must be made early.

Create an Implementation Plan: Outline all activities and projects that the IC will support in the next 12 months, including the assignment of specific responsibilities to each staff member.

Communicate the Plan: Submit the plan to senior managers, IC staff, clients, and information systems management for approval. Incorporate any relevant changes. This is the final product of many meetings with all four groups, selling it should be relatively simple.

Review the Plan Regularly: The process is a continually adapting one. The Strategic and Tactical/Implementation Plans are dynamic in nature and should be reviewed annually and quarterly respectively. (Collier 1989)

3. The Benefits of Strategic Planning

The need for a stated strategy and direction serves many purposes. In an environment of rapid technological change, planning may seem fruitless. However, the opposite is actually true. Planning forces leaders to look into the future, effectively forcing them to think about what they want to accomplish. In doing so they uncover many resources and barriers to the successful accomplishment of the plan. Some of these will change, but often, most of them remain the same. Therefore, when changes do occur, leaders with plans fare better than those without, simply because they know how the changes will affect their organization, both in the short and long term.

Additionally, subordinates at any level prefer to have some idea about where their efforts will take them. Defining a plan provides subordinates with a statement of direction and generates commitment to the goals of the organization (Stoner and Wankel 1986). This thought is exemplified in a recent study of large corporations. The research identified a lack of education of users with regard to the company's long-term objective for personal computing as a critical problem faced by the organizations evaluated. Users were aware of training being offered in many areas, but they were unclear as to the strategic significance of their computer skills to the corporation. (Guimaraes 1986)

The results of a study conducted by the General Public Utilities Corporation identified the benefits of the formal planning process in an effective, concise manner:

1. Creation of a "Road Map" for the future development of information systems and data bases to meet the overall information requirements of the organization.
2. Increased capability of end-users and information processing functions to better support and adjust to the strategies, planning, objectives, and goals of the organization.
3. Enhanced availability of data and information over the long term through the formal activities necessary to plan for and manage the data resource.
4. Improvements in the detail, design, and implementation of information systems by the pre-definition of the scope, levels of consistency, data base design and integration aspects of control and a primary source of project overruns, when performed during the detail design phase.
5. Provision for a significant information source to other information support planning activities for items such as hardware, software, office systems, and communication networks.

6. Development of a group within the organization that can provide institutional knowledge regarding decisions made during the planning process.
7. Improved coordination and communication of the organization, resulting in better plans and overall operation.

I. SUMMARY

This chapter has focused upon the issues of managing end-user computing through the development of controls and planning. It appears that the information center provides the organization best suited to develop and support the end-user community in this activity. Senior management must furnish the broad-reaching goals for end-user computing within the organization, providing the direction and motivation for the information center to develop strategic plans that identify how the organization will be managed to accomplish management's plan.

The role of the information center is linked to the strategic objectives of the organization and growth of end-user computing skills through the planning process. The theories presented throughout this chapter provide methods for developing the organization's ability to achieve long-run efficiencies expected with the introduction of end-user computing. Organizations integrating these control methods may eventually achieve strategic advantages over firms failing to effectively manage the end-user phenomenon.

In summary, the effective management of end-user technology requires the organization to accomplish three objectives. First, upper management must define its long term goal for automation within the organization. Subsequently, it must plan for the achievement of its goal, using strategic planning techniques with

predetermined decision points. Finally, the introduction of new technology into the organization must be achieved in an orderly fashion to provide optimal information management support with contained procurement costs.

The information center strategic plan should be combined with the data processing department plan into an integrated support strategy for the organization (IBM 1984). This overall design for computing support provides employees/soldiers with an image through which they may view all computing activities in the organization. The resulting benefit of this approach is an organization that knows where it is going, and has an idea about how it will get there.

IV. US ARMY INFORMATION CENTERS

This chapter discusses the history of Army information centers, and the mission that they have been designed to support. It also provides a general overview of current policy relating to information management including details on organization, funding and personnel management. The discussion lays a foundation for understanding the strengths and weaknesses of Army information centers. Understanding these issues provides the framework for subject areas discussed in later chapters.

Today's technology can process, transfer, and store more information than ever before; a trend that will continue for years to come (Panko 1987). The problem then, is not just one of getting relevant information but one of attaining such information that is timely, accurate, and concise. The most essential mission of the Army information center is to train, assist, and encourage leaders at all levels in their pursuit of quality information. Information centers provide an opportunity to improve the information processing capabilities of Army decision makers at all levels of command (Bass 1988).

A. HISTORY OF INFORMATION CENTERS IN THE US ARMY

On 8 May 1984 General John A. Wickam Jr., then Chief of Staff of the Army, took the first of many steps to improve information management in the U.S. Army (HQDA Msg DACS-ZA Subject: Establishment of Information Mission Areas). He approved a revolutionary plan designed to revitalize information

management in the Army. This plan defined the long-range goal of integrating the subfunctions of telecommunications, automation, visual information, records management, and publications into one cohesive unit called the Information Mission Areas.¹ This plan sent a message to all concerned, signalling sweeping changes in the organization and implementation of information management in the US Army. (Doyle and Craven 1985)

General Wickam's guidance laid the framework for the founding of Army information centers in September 1985. The official directive addressing the establishment of information centers came from LTG Emmett Paige, then Commander, US Army Information Systems Command, in the form of an official message to all installation Directors of Information Management (DOIM). The message directed all information managers to establish information centers to provide expert customer service to all users of micro-computers. The message further directed that all resources to accomplish the mission be taken "out of hide", meaning that additional funding to support the information centers would not be provided. The directive further recognized that the majority of Army micro-computer users were not trained in the use of computers to perform their daily jobs, and that training/education was critical to the successful implementation of Army policy regarding information management. (USA 1985)

The period from October 1985 through June 1987 proved to be an active time for information centers throughout the Army. During this period every Major Area

¹ A complete description of the IMA concept and guidelines for implementation is provided in AR 25-1. The regulation became effective on December 1, 1988.

Command (MACOM) in the Army and every installation in the Continental United States (CONUS) established an information center of one type or another. These implementations ranged from one-man organizations that simply provided a point of contact for inquiries to large support organizations of ten to twenty people, providing a multitude of services. (USAISC 1987)

It was during this period that the Army contracted for research into information center implementation techniques. The research was conducted by the Information Systems Networks Corporation and monitored through the U.S. Army Institute for Research in Management Information, Communication, and Computer Sciences (AIRMICS). The purpose of the research was to conduct a literature review, and develop an Information Center Planning and Implementation Guide. The result of the research was the US Army Information Center Planning and Implementation Guide. (DA Respub 1986)

A second project was initiated following the release of the initial planning and implementation guide. The mission of this research was to perform an evaluation of six Army installation information centers. The result of this effort was a document tabulating the results of the interviews conducted at the information center sites reviewed during the research contract (DA Respub 1987). Suggestions from the field were incorporated into the IC Planning and Implementation Guide and the final copy was released to all Information Systems Command organizations in Jan 1987. (DSCPLANS 1987)

The years of 1987 and 1988 were less prolific in terms of policy and guidance. During this time, the two top agencies for defining Army doctrine and

policy on information, automation, and communication issues, DISC^{4 2} and the Information Systems Command³, were involved in a complete overhaul of information management policy. This period allowed information center managers, computer users, and policy makers time to reflect upon the lessons learned and to begin developing plans for the future.

Directors of Installation Management (DOIM) and information center managers may have interpreted this period as one of diminishing interest in the information center concept. However, either by plan or by default, this period allowed Army information managers time to gain experience and expertise in the management of individual computing techniques. In doing so, the Army has permitted management concepts to overtake the initial wave of end-user technology, providing an opportunity for proactive leadership.

The first major revision of Army Information Management policy since the inception of the information center concept is near completion. Virtually every major publication regarding information management in the Army has been rewritten and will be released by the Spring of 1989. The release of these regulations marks the first official regulatory support of information centers. The release of the first of these new regulations written during this period occurred on November 18, 1988.

² Office of the Director for Information Systems Command, Control, Communications, and Computers.

³ The Information Systems Command is the immediate subordinate command reporting to DISC⁴. Serves as the overall supervisory control for all Installation Information Management Activities.

This regulation, AR 25-1⁴, provides the first new guidance on information management since the inception of the Army information center concept.

Other regulation revisions will be released over the next six to twelve months. A review of the drafts of these publications indicates that most information center guidance will take the form of recommendations rather than requirements. The generally accepted opinion for the lack of directive guidance focuses upon funding issues and the diversity of installation automation capabilities. (Craven 1988)

B. CURRENT POLICY AND GUIDANCE (DEPARTMENT OF THE ARMY)⁵

The official policy of the Army regarding the information center has remained virtually unchanged since 1985. However, the level of experience and management expertise involving the implementation of the concept has grown considerably during this time (Ambrosio 1988). This experience, combined with active research into the success and failures of civilian information centers, and the formalization of the Information Mission Area Concept (IMA) has led to the formalization of more specific policies regarding Army information centers.

The Army has 220 installations worldwide that are required, by Department of the Army directive, to provide information center support. Currently these

⁴ Army Regulation 25-1, The Army Information Resources Management (IRM) Program. Provided all new policies on the Information Mission Areas and their integration into IRM, as well as descriptions of major programs comprising IRM Program.

⁵ This portion of the research analyses current Army policy, prior to the release of the new regulations referenced earlier. This approach is necessitated due to the constantly changing nature of draft regulations prior to their actual release.

requirements are being supported by seventy (70) information centers in the Continental United States (CONUS), forty-five (45) in Europe, and eight Regional Information Centers in WESTCOM (Hawaii, Korea, Alaska, Panama, Puerto Rico, and Japan). Agencies not receiving support from the above information centers are either not being satisfied or are provided satellite service by information centers in the local area. (USAISC 1987)

The larger vision of information management in the Army cited by the Policy Directorate of DISC⁴ focuses upon the integration of automation technology into Army organizations. The goal cited by Mr. Ronald Craven⁶ is

" ... creating an environment in which technology is not an end in itself, but rather a means to an end is our goal. Creating the automated workstation should not be the focus of the Army's efforts. Rather we should focus on creating an environment that increases the productivity of our units. Our job as information managers is to provide the wherewithal to get the data to its destination in a form that is accurate, timely, and appropriate. The information center and the use of the electronic work station by office workers is a part of the overall restructuring of information management in the U.S. Army to attain these goals."

This philosophy serves as the guiding influence for the development of current Army information management policy. The IMA concept was conceived in an effort to achieve this environment. The discussion that follows provides insight into the mission of Army information centers, their integration into installation information management activities, and the IMA.

⁶ Mr. Craven serves as the Chief of the Policy Division within the Office of the DISC⁴.

1. The Mission

The function selected to provide the assistance needed to maximize the Army's investment in end-user computing is the Information Center. The mission of the information center, as defined by the Department of the Army, is that of providing the end-user community with integrated information support. Specifically, the information center provides advice and assistance in the areas of software and hardware productivity tools, data access techniques, user training materials, and integration of the electronic work station into daily operations. The ultimate goal of this support is to increase user self-sufficiency in the processing of information, thereby increasing productivity. (DA Pam 25-7(Draft) 1988)

The mission statement provided by the Department of the Army is broad and all encompassing. The necessity of a generic mission statement is dictated by the diversity of mission, and aggregate computer literacy at Army installations throughout the world. Specifying a meaningful mission statement and associated objectives for all information centers would be cumbersome and impractical.

An example of this diversity is provided by comparing two organizations, each requiring radically different end-user. The information center serving the Department of the Army Decision Support Center in Washington, D.C., provides support to over 6000 end-users (Ingalls 1988). The people using the mainframe and micro-computer capabilities at this facility are required to make decisions quickly, utilizing the most advanced information processing capabilities available. Conversely, soldiers performing routine record keeping functions in an artillery battalion require

more basic computing skills. Both user groups have equally important, though diverse, needs.

Funding issues also restrict the Army Staff's ability to prescribe uniform standards for all Army information centers (Craven 1988). Army leaders often find it necessary to limit the requirements made upon agencies that are not funded properly. The lack of additional funds provided specifically for information center operations has made the prospect of specifying more precise information center objectives and guidelines unattractive to senior Army leaders (Craven 1988).

The field study accomplished during this research indicates that individual information center mission statements vary widely from installation to installation. However, 93 percent cite the goal of "increasing user self-sufficiency" in the processing of information which will increase productivity in the long term (DA Pam 25-7 (Draft) 1988). The IC should assist users to assume responsibility for their own systems development and data processing in accordance with organizational requirements. Ultimately the IC is to be "the" point of contact for all questions and support for the IMA functional areas.

The Army's implementation of a decentralized management approach regarding information center and end-user computing standards provides the flexibility necessary for such a diverse organization. This strategy allows installation commanders the opportunity to define policy and standards that fit the needs of their organization. However, it is essential that all installation and organization information centers publish specific mission statements which provide goals and boundaries of their support. (DA Pam 25-7 (Draft) 1988)

2. Integrated Service Support

Typical information centers in the US Army provide user training, hardware/software displays and demonstrations, software clearing house activities, and technical user consultation services. The area of technical user consultation may include, but not be limited to, information requirements development, technical configuration requirements, systems analysis and design, local area network analysis, and IMA regulatory guidance. (DA PAM 25-7 (Draft) 1988) Additionally, the information center may be involved with the procurement process, either in an advisory function or in the formal approval process. The range of these activities is limited only by the support provided the information center by the installation commander and Director of Information Management (DOIM), and the management capabilities of the information center manager. Figure 4-1 provides an example of how the information center fits into installation information activities.

C. TODAY'S INFORMATION CENTERS

The majority of Army information centers have been in existence for two to three years (USAISC 1987). The first of these years was spent on procuring resources, personnel, office space, and equipment to properly furnish the center. The next one to two years have been spent training users on a wide range of computing techniques ranging from basic procedures at most installations to mainframe connectivity and decision support systems (DSS) at some of the more advanced

installations. Army information centers are barely out of their infancy and only now are they starting to move from their initial stages of growth.⁷

Initially, two themes were common to the mission statements of Army information centers: (1) Promoting user self sufficiency through training and education; and (2) Making the latest in technology available to the user. These two objectives served as guideposts for information center managers in the Army.

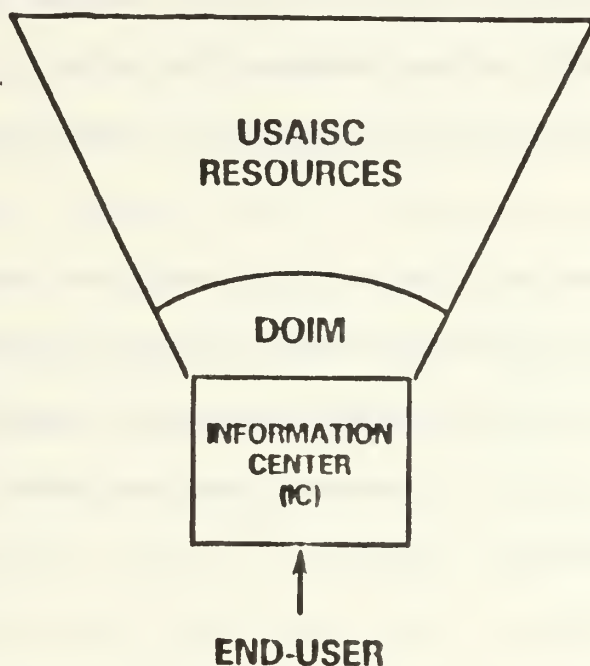


Figure 4-1
The Army IC Conceptual Design

⁷ Based on Nolan's 4 phase Growth Stage Model. Initial Growth stage is characterized by loose management and budget policies, limited interest by senior management, and very few management controls. (Nolan, 1983)

The field study documented in Chapter V indicates that these two objectives still permeate the majority of mission statements of today's information centers. Respondents indicated that 70 percent of information center managers see a decrease in the need for basic computer skill training. Computer users in the Army are collectively becoming more and more literate in the area of computer usage in general. The need for training at technical and staff oriented installations seems to be gravitating toward the areas of local area network utilization, mainframe connectivity, and access to large databases. This is not to say that basic user training is not necessary, but the overall level of computer literacy appears to be improving.

During personal interviews conducted during this research, three issues, organization, funding, and manning, seemed to dominate the thoughts of information center managers when discussing information center operations. The following discussion provides insight into the causes, effects, and possible solutions of each of these challenging problems.

1. Organization

A discussion of the organization of Army information centers is best initiated by providing a brief description of the organization of information systems management in the Army in general. A discussion of how information centers interface with the installation or organization information systems management activity is then presented.

The overall coordinator of all information systems command and control issues relating to computer systems and telecommunications activities is the Office

of the Director of Information Systems Command, Control, Communication, and Computers (DISC⁴). This Office is located in the Pentagon at the Department of the Army headquarters. DISC⁴ develops all plans, policy, architecture directives, and strategic planning activities for the Department of the Army regarding information systems management and control. (AR 25-1 1988)

Reporting to DISC⁴ is the Major Area Command (MACOM) called the Information Systems Command (ISC). ISC's job is to provide operational guidance and support for all the Major Subordinate Commands (AR 25-1 1988). These subordinate commands include three separate signal commands, the Information Systems Engineering Command, and the information systems commands of WESTCOM and Japan. The separate signal commands are 5th Signal Command (US Army Europe), 7th Signal Command (Continental United States), and 11th Signal Command (Korea). Figure 4-2 provides an organizational chart depicting the overall structure of Army Information Systems Command.⁸

The information center is a sub-element of the DOIM activity that is generally established on the same level as the data processing function and communications functions. The Director of Information Management (DOIM) serves as the installation information management officer. The DOIM is responsible for the administration of all communications and computer facilities located at his installation. The DOIM reports to two commands directly, ISC and the Commander

⁸ Additional information on the organization of the Information systems agencies in the Army is provided in AR 5-3.

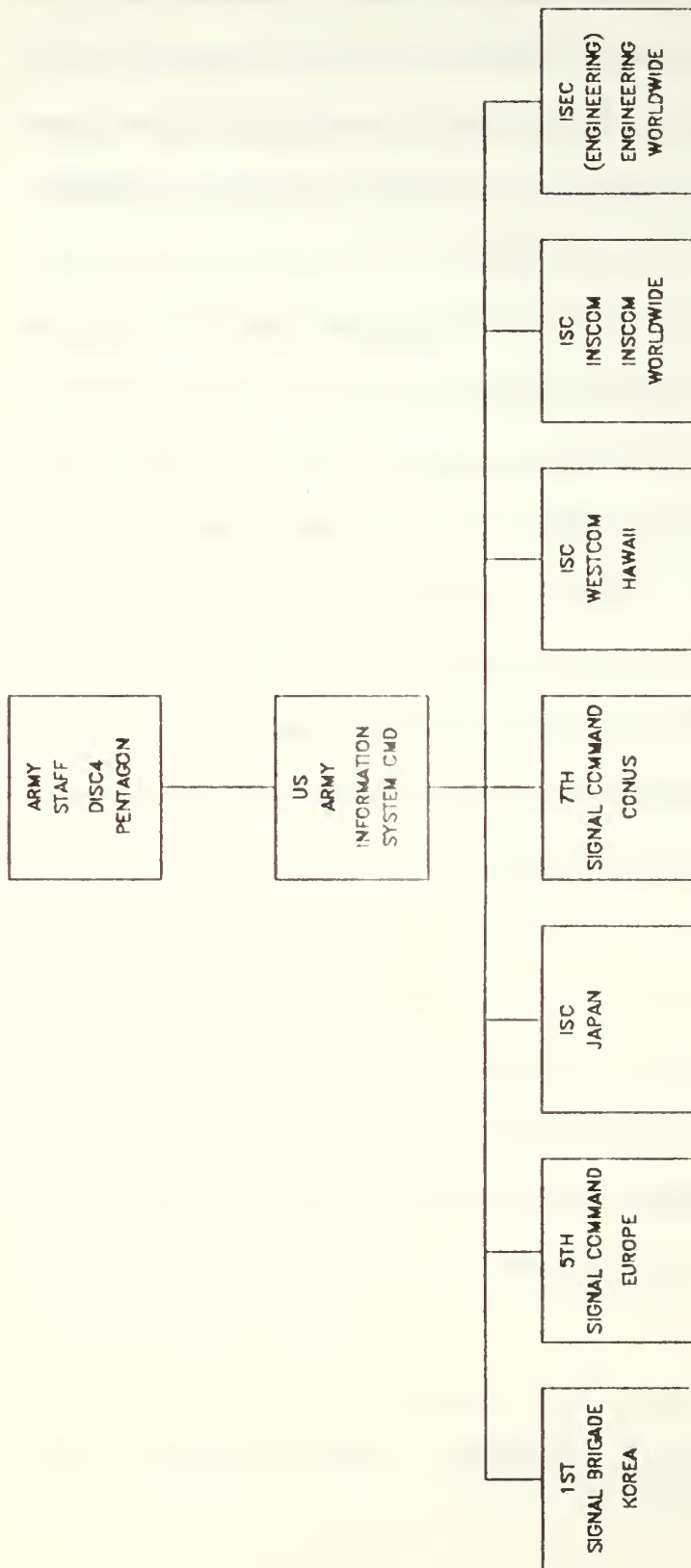


Figure 4-2
Army Information Systems Organization Diagram

of the installation to which the DOIM is assigned. This arrangement is referred to as the "dual-hatted concept", meaning that the DOIM is responsible to both organizations simultaneously.

2. Funding

The requirement to fund information centers came with no increase in operations or personnel funding. Furthermore, it has been claimed that budgets for the information services function at all installations have been reduced by nearly ten percent annually since the adoption of the information center concept in 1985. These two situations have joined to create difficult obstacles for planning and budgeting officials.

However, the survey conducted as part of this research indicates that although installation information management budgets have been reduced on many installations, information center budgets have risen significantly for 80 percent of those responding. The median information center budget rose from nothing in 1985 to \$301,000 in 1987. Figures for 1988 indicate that this figure climbed to \$350,185. Initial figures for 1989 indicate a slight drop to an average of \$329,881.

These figures may indicate a significant trend for information centers. Specifically, it may be inferred that installation information managers have recognized the need for information centers. Acknowledging this concept provides the first step in ensuring the future of information centers.

The adoption of the information center as the interface between the user community and the IMA functional areas has served to broaden the mission of the Army information center (AR 25-1 1988). The successful integration of these

functions into the information center must be accompanied by significant funding increases for additional personnel. Granting these increases may prove to be a serious problem for information management in view of anticipated budget constraints.

The funding dilemma leads to the need for innovative measures to accomplish the mission. Such measures may include a wide range of financial possibilities and reorganization techniques. These may take the form of realigning funding at the installation level or by reallocating funds within the DOIM function. The integration of IMA support into the information center may provide the opportunity to centralize user support into the information center. Specifically, each of the IMA functions may provide personnel to the information center to provide a central office that users may visit to request IMA functional area support. Several information centers at Fort Gordon, Georgia, have resident experts from the IMA functions centrally located with IC staff, providing the front line interface between installation clients and information activities.

Army leaders could also look to the automation of routine, labor intensive tasks that are performed daily by the information center staff. Automation of these tasks could take the form of knowledge-based systems (expert systems) that provide answers to routine questions commonly asked by users. This support could be provided by online computer based systems or by providing a telephone operator who could conduct system queries (using a matrix chart or computer aided knowledge based system).

The development of knowledge-based systems to accomplish the automation of the tasks discussed above is beyond the scope of the typical DOIM application development capabilities. Such development would need to be coordinated and conducted either by civilian contractors or by the Small Computer Engineering Center (CEC)⁹ that is available to all information centers. The basic application could then be modified at each installation.

Most certainly the development of these systems will involve expending funds that are in short supply. However, by centralizing the effort and personalizing the applications to particular installation needs, an overall savings in personnel and application development are likely. Once developed, these techniques may provide information centers with the means to accomplish the mission described by Army leadership without the need for more employees.

3. Manning

The individual skills of the information center staff are crucial to the success of the information center. The information center manager should be attuned to the needs of his client organizations, providing the tools that enable them to get their mission accomplished. The entire information center staff must serve as the champions of the information center concept, providing continual support and documentation of services to users and their supervisors. In doing so a positive

⁹ The Small Computer Engineering Center is located at Fort Huachuca, Arizona. It has a three pronged mission to support end-user computing issues. One of its responsibilities is to develop custom system designs that are beyond local design capabilities.

image is created for the information center, generating further support from the community (Carr 1988).

The results of the field study indicate that lack of personnel in the information center is undoubtedly one of the most critical problems facing IC managers today. The double edged sword of reduced funding and personnel cuts may well prove to be the one obstacle that information centers may be unable to overcome. One installation DOIM recently provided the status of personnel in their command as follows:

Personnel Needed (DOIM defined):	50
Personnel Authorized (Army defined):	42
Personnel Assigned:	40
Personnel Departing (due to early out):	31
Projected incoming:	<u>4</u>
Net Personnel On-hand in 90 days	13

The situation depicted above indicates several problems with the management of personnel in the DOIM function and subsequently in the information center. First, not only does this manager not have the personnel needed to operate, the manager does not even have the personnel he is authorized. Additionally, the staff has been reduced beyond reasonable limits due to the need to reduce the size of the active duty forces within the Army (Army Early Out Program). Finally, a hiring freeze directed by Congress further distorts the problem by making it impossible to hire personnel to fill the vacancies created by the Early Out Program. This case, although extreme, exemplifies how personnel shortages can make it impossible for the information center to accomplish its mission. (Rue 1988)

This situation also exemplifies the difficulty in developing a staff that is competent, well-trained, and effectively manned within the military. The recommended solution is to staff the information center with non-military personnel. IMA functional areas may also supplement the information center staff as dictated by the degree of centralization desired by local commanders. This will at least reduce the effects of troop rotations, and force reductions. Additionally, continuity will be enhanced through the maintenance of institutional knowledge by civil service employees that tend to remain in duty positions for longer periods of time.

D. SUMMARY

The foregoing discussion has presented critical issues faced by today's Army information centers in limited detail. However, it provides necessary background data on Army information management and information center characteristics to aid the reader in understanding issues discussed in Chapter V.

V. A FIELD STUDY: INFORMATION CENTERS IN THE US ARMY

This chapter presents the findings of the field study conducted in conjunction with this research on Army information centers. It presents factual data regarding Army end-user computing and information center management as perceived by Army information managers. The study also details current and future roles of Army information centers as identified by information center staffs throughout CONUS.

The study is designed to provide a general overview of Army information centers, exploring end-user computing issues as they relate to information center management. It does not test specific hypotheses. Instead, it provides insight into the environment in which Army information centers exist as perceived by the respondents. The results of the survey will be interpreted in concluding chapters.

A. THE STUDY

Data for this project was sought from 85 information center managers and information management functions located at installations in the United States. No information centers affiliated with units located in foreign countries were polled. Appendix A provides an example of the questionnaire used to provide responses. We received 74 surveys, yielding a response rate of 90.7 percent. This is an exceptionally high figure for this type of survey (average response rates are approximately 25-30 percent) attributable to the relevance of the topic as well as the military environment in which it was solicited.

Follow-up interviews were conducted by telephone subsequent to the receipt of the mail survey responses. A simple protocol was used to randomly select 15 information center managers from whom more specific information about the survey was solicited.¹ The interviews were unstructured in nature, permitting the respondent and interviewer to elaborate on issues of particular interest to both.

A comparison of respondent and non-respondent activities indicates that no bias is present. However, the sample is biased in that all respondents were information center managers, staff members, or Directors of Information Management (DOIM). The scope of the research dictated a limited focus, thereby requiring a deliberate strategy of obtaining the information center's perspective on end-user computing and information center management. (Guimaraes 1984)

The chapter presents the results of the study in factual form. Demographic data is presented initially and followed by presentation of common user services and capabilities, software management, and control issues. Respondent impressions of the IMA concept are succeeded by several concluding issues of interest communicated by responding managers.

¹ The technique used to select secondary respondents involved organizing all surveys in the order received and selecting every fifth response for potential telephone interviews. The sampling was accomplished without replacement.

B. PERSONNEL ISSUES

A wide range of information centers were represented in the survey. Virtually every Army activity was represented.² The number of users supported ranged from 200 to 10,000. Further Demographic data for respondent activities is provided in Figure 5-1.

Number of Users Supported	Number	Percent
0-200	1	1.8
200-400	2	3.5
400-600	5	8.8
600-800	3	5.3
800-1000	5	8.8
1000-1500	14	24.6
More than 1500	23	40.4
Supporting DOIM Budget (In \$ Millions)		
1-3	8	16
3-6	17	31
6-9	12	23
9-12	3	6
more than 12	13	24
Primary Installation Activity		
Combat Division Related	12	18.5
Training Installation	14	22.6
Major Command Staff	16	25.1
Technical Services	23	35.3

Figure 5-1
Demographic Data

² Every information center in CONUS was involved in the study. Some installations had multiple information centers. therefore, respondent activities represented every major type of activity in which the Army is involved (divisional, technical, administrative, training).

Nearly 80 percent of the information centers polled were headed by either a GM-13 or GS-12. These managers indicated that the majority of their staff is composed of civilian employees of grades GS-5 through GS-11. Figure 5-2 provides more specific data on the personnel staffing information centers participating in the study.

Grade or Rank	Overall Percentage	Average Salary
GS-03	.004 %	\$ 13,250
GS-04	.006 %	\$ 15,313
GS-05	5 %	\$ 17,134
GS-07	15 %	\$ 21,232
GS-09	33 %	\$ 25,963
GS-11	31 %	\$ 31,412
GS-12	11 %	\$ 37,646
E-4	2 %	\$ 14,000
E-6	1 %	\$ 19,400
E-7	.09 %	\$ 25,500
CPT	2 %	\$ 36,600
Average Salary		\$ 25,883

Figure 5-2
Army Information Center Salary Information

Figure 5-2 provides the average income of all information center staff members.³ A study documented in August 1988 indicates that the median salary of civilian information center personnel is nearly \$38,000 (Lindholm, 1988). Comparing

³ Calculations based on 1988 pay rates. GS averages calculated at step 5 pay level. Military pay rates based on the sum of Basic Allowance for quarters (BAQ), subsistence (BAS) and average Base Pay (calculated using average in service (TIS) for members of that grade). Source Department of Defense.

these two figures indicates a wage gap between the two factions. The difference between these two groups may be indicative of future problems in maintaining quality staff members in Army information center activities.

Conversely, salaries for Army information center managers appear to be closer to their civilian counterparts. The median salary for Army information center managers responding to the survey is \$40,089 whereas civilian information center managers received \$42,600 (Lindholm, 1988). While a small wage discrepancy appears to exist between civilian and government service managers, this gap may expand or contract when comparing specific civilian retirement plans with those of government employees.

C. AGE OF THE INFORMATION CENTER

September 1985 marked the birth of the Army information center concept. Consequently, most discussions regarding the age of Army information centers revolve around that date as the point from which the function came to exist throughout the Army. However, the survey results indicate that only 19 percent of the responding information centers were founded prior to January 1986. Nearly, 45 percent of the responses reflect information centers established in 1986 and 23 percent in 1987. The average age of today's Army information center is calculated to be 2.1 years.

D. FINANCIAL SUPPORT

The median budget level for all information centers and their affiliated DOIM activities is provided in Figure 5-3. The table indicates that median budgets for

installation information management activities and their associated information centers have risen in 1987 and 1988. The median information center budget rose from nothing in 1985 to \$301,000 in 1987. Figures for 1988 indicate that this figure climbed to \$ 350,185. Initial figures for 1989 indicate a slight drop to an average of \$329,881. The table also provides information on annual and overall increases in funding received by the two activities during the three year period.

Further analysis of the information provided by field managers indicates that information centers are faring much better than their supporting DOIM functions. Information center managers indicated that their 1988 annual budgets had increased by 80 percent over the previous year. This trend continued in 1989 budget projections, with 87 percent indicating budget growth over 1988. Conversely, only 52 percent of supporting DOIM functions received increased financial support in 1988. It is proving to be a worse year for DOIM budgets in 1989, with only 41 percent of responding managers reporting fund increases.

Budget Year	Median IC Budget	Change	Median DOIM Budget	Change
FY 87	\$ 301,000	N/A	\$ 6,195,908	N/A
FY 88	\$ 350,185	+ 16 %	\$ 6,578,979	+ 6 %
FY 89 (Proj)	\$ 329,881	- 6 %	\$ 6,700,894	+ 2 %
Net Gain		10 %		8 %

Figure 5-3
Budget Trends, Information Center and DOIM Activities

Although it is difficult to determine the full extent of these comparisons, one fact seems clear. Installation information managers are recognizing the importance of information center operations and are allocating financial support at the expense of other information services. How long this condition will continue is still unknown.

E. USER SERVICES AND CAPABILITIES

1. The Users

Respondents indicated that 83 percent of their parent organizations provided some form of mainframe support activities prior to the establishment of the information center. Some organizations provided support for other computing techniques as well. Specifically, 27 percent supported mini-computer applications and 35 percent micro-computer products. Today, these same organizations indicate that 83 percent of their users are micro-computer oriented, with 17 percent using either mainframe or mini-computer applications. Information center managers indicated that 78 percent of their clients possessed only minimal knowledge of the computer environment. The type of applications currently being developed by clients of Army information centers is reflected in Figure 5-4.

Survey respondents indicate that 75 percent of their customers are learning at an acceptable pace overall for their organizations. Replies also indicated that 10 percent of the user population is growing at a much quicker pace, one that is not supportable by the information center. Only 6 percent of the users supported appear to be developing at a rate slower than expected by IC staffs. These figures indicate that although most users supported by the information center possess only

basic computer literacy skills, they are developing more advanced skills quickly. Some clients have even grown beyond the skills provided by the information center.

Type of Application	Percentage
1. Basic Application Useage	93 %
2. Advanced Application Development	63 %
3. Use of Decision Support Systems	25 %
4. Development of Decision Support Systems	6 %
5. Basic Programming (Structured Language)	7 %
6. Advanced Programming (Structured Language)	5 %

Figure 5-4
Types of Applications Used by Army Information Center Clients

2. Supported Software

The need for limiting the number of software products supported has been recognized by 81 percent of responding Army information centers. However, 86 percent of those restricting the number of products supported still provide informal guidance to users as requested on products not formally supported by the organization. Figure 5-5 provides details on the products formally supported by Army information centers.

There is a very wide range of software products supported by Army information centers. These products are mostly micro-computer oriented, although mainframe products are also well represented. This fact indicates that users are becoming more comfortable with a variety of computer types.

SUPPORTED PRODUCT

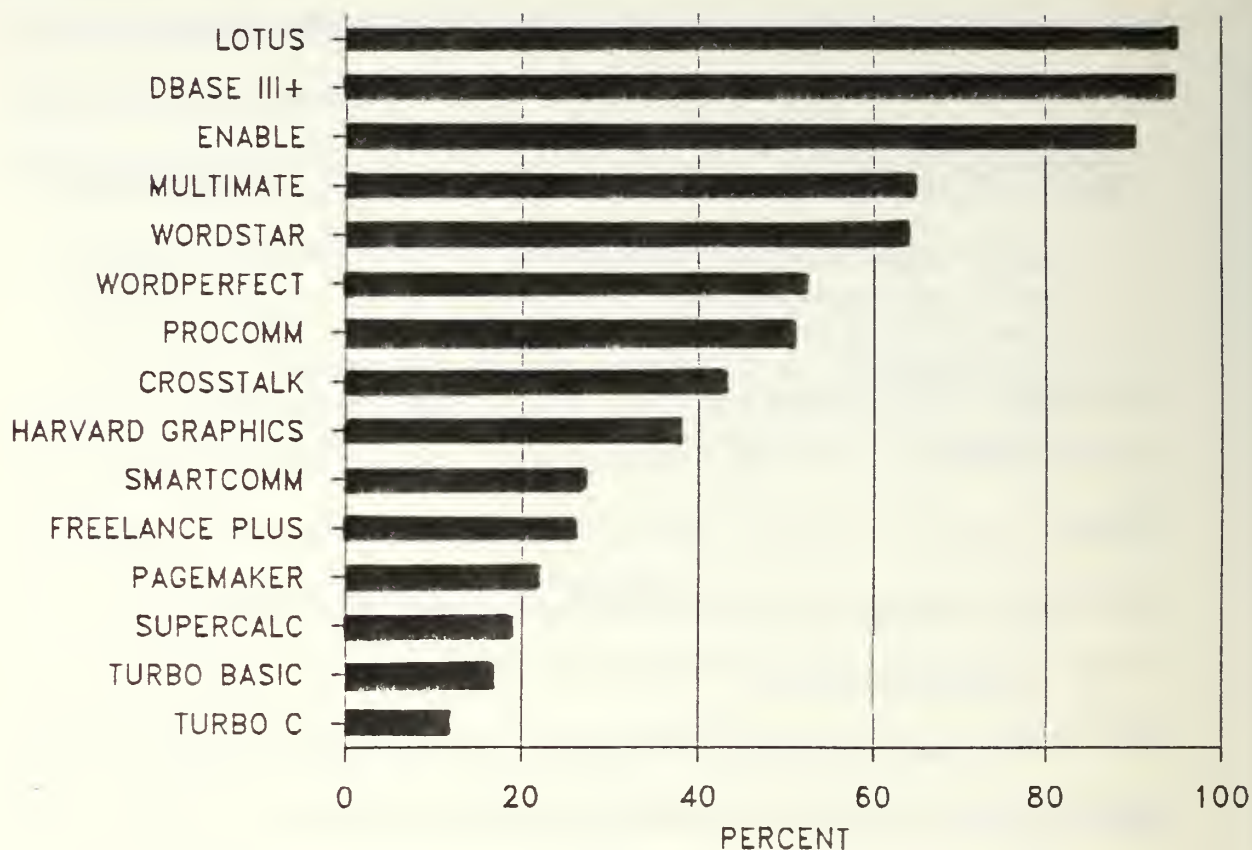


Figure 5-5
PC Products Supported by Army Information Centers

3. Management Training

An area of end-user computing receiving minimal attention in industry and military publications is end-user computer management training. Current literature focuses more on training users rather than upon preparing managers for directing office automation activities. It would seem that maximizing the productivity of end-users would be enhanced by providing supervisors the skills necessary to lead their subordinates' computing efforts. However, respondents

indicate that this is not always the case. Information center managers representing 40 percent of those replying indicate that they offer no computer management training. Generalizing these findings would suggest that the users of 56,000 of the 140,000 micro-computers purchased by the Army in the last two years are being managed by leaders with no formal computer training.

Information centers that do offer some form of management training provide education on issues such as a general overview of supported software products (52 percent), data integrity and maintenance (17 percent), compatibility issues (32 percent), and hard disk management (25 percent). Management effectiveness training is provided to leaders at 20 percent of information centers on all purpose packages such as PROFS, Enable, and Symphony.

F. CONTROL ISSUES

Control was a role cited by 90 percent of the respondents indicating that the information center provided a control function in the organization. However, most respondents qualified their response stating that they are hampered by limited guidance from Headquarters Department of the Army (HQDA) and Information Systems Command (ISC). Specifically, managers are developing their own controls and management objectives in lieu of guidance from these two policy making activities. Furthermore, financial and personnel shortages are inhibiting the implementation of the controls they do define.

There appears to be a fairly uniform distribution of management techniques used to implement the information center concept. Respondents indicated that 40 percent of Army information centers are centralized functions with specific rules for

operation, maintenance, and procurement activities. In excess of 29 percent impose informal controls, providing minimal standard operating procedures, opting more toward suggesting and recommending methods of user operations rather than requiring program compliance. The remaining 31 percent indicated that they impose very few controls, acting more as information management monitors than control functions.

The range of control measures being implemented by Army information centers appears to be quite broad. Common areas of involvement in this area include limiting the number of software products supported, approving procurement requests, and overseeing property accountability procedures.

Army information center managers, like their civilian counterparts, indicate that they cannot be all things to all people. They have responded to this issue by limiting the number of software products supported. The procurement of software for micro-computers requires information center approval in over half of the organizations involved in the survey. Informal support to users needing assistance for non-standard products is still provided by 86 percent of these information centers however.

This research cannot determine whether supporting non-standard software products undermines the original intent of limiting software support. However, it would seem to be more difficult to give accurate technical advice on products not used routinely by staff members. Furthermore, providing guidance on non-standard products increases the workload on the information center staff. Both of these

situations can be detrimental to the reputation and subsequent success of the information center.

Previous research indicated that many information centers were becoming involved in the procurement of micro-computer products. Results of the survey indicate that 58 percent of responding information centers are involved in the approval of hardware and software purchases. Follow up interviews indicated that information centers are being integrated into the organizational procurement process, forcing supported units to comply with established hardware and software standards.

G. THE INFORMATION MISSION AREA (IMA)

We think that the integration of the IMA into the information center is the most broad reaching Army initiative that will affect the future of Army information centers. One section was dedicated to identifying how well the concept is being received by field managers. Overall, most managers indicated that they are aware of the initiative, yet they are unclear about the ultimate effects on the information center.

Integration of the IMA has been initiated by 82 percent of responding managers. This indicates a very proactive response to an initiative for which no specific guidelines for integration or official regulatory requirements exist. Those information center managers not involved in the assimilation process indicated that they are unclear about the direction of the initiative.

Figure 5-6 provides specific information regarding the percentage of information centers providing some level of support on each of the five IMA areas. It should be noted that only 18 percent of responding managers provide support for

all five IMA areas. Two or three of the five functions are supported by 84 percent of the respondents however.

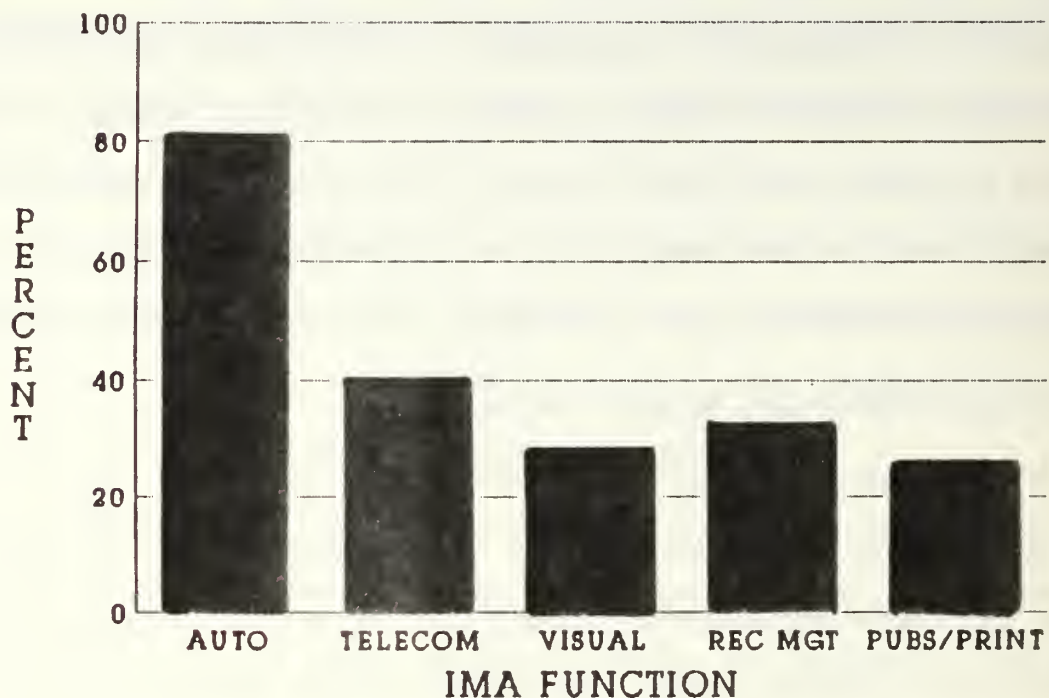


Figure 5-6
IMA Functions Supported by Army Information Centers

An interesting result of the survey indicates that although 82 percent of information centers are taking action to implement the IMA integration, only 69 percent responded that the IMA concept is a good idea supportable by information management. Furthermore, 58 percent of the respondents indicated that the IMA is a practical concept. These responses demonstrate that work needs to be done to gain the full support of field managers regarding the IMA integration. Effective change management is critical to the success of any new initiative.

H. OTHER ISSUES OF INTEREST

1. Purpose of Existence (Need vs. Directive)

There are two types of information center organizations in existence in the Army today; those required by directive and those established by organizational need. The first classification involves information centers founded in response to LTG Paige's directive. This type of information center was founded as a result of the Army pulling subordinate commands into the age of the electronic workstation. (O'Connell, 1988)

Conversely, the latter classification pertains to information centers initiated by end-user coalitions. The need for information centers was identified by internal studies⁴ and user groups. These forces generated support for transition by Army organizations into the electronic workstation environment. (O'Connell, 1988)

It is not clear exactly how many of each type of information center existed initially. However, our research indicates that currently 33 percent of information centers consider themselves as organizations founded due to need rather than Army directive.⁵ These information centers appear to be well staffed, receiving a higher percentage of overall organizational funding than their counterparts.

⁴ HQDA endorsed IBM Information Systems Plan methodology for evaluating information management needs. Installations conducted internal evaluations using the IBM Information Systems Planning Guide or contracted IBM directly to conduct studies that provided planning initiatives. These studies led to information center requirements for several installations such as Fort Ord, California.

⁵ Refers to the directive from the Army Chief of Staff in 1985 that required the establishment of small computer information centers. (USA Msg 1985)

2. Role of the Information Center

Chapter IV referenced the need for a broad Department of the Army (DA) mission statement. The DA mission statement is further defined by local information managers. The results of the field study indicate that mission statements provided by respondents center on three issues.

Most of those responding (94 percent) see their organizations as the link between installation/organization information management and the end-user community. This link is defined in many ways. However, most identified themselves as a "one-stop-shop", capable of providing the user with either the answer to their question or the name of the person with the answer. Their stated goal was the elimination of wasted time by their clients.

Promoting user self-sufficiency is a primary goal of 89 percent of those responding. This aspiration is achieved through training programs aimed at helping the users to answer their own questions, emphasizing user manual and tutorial usage. Other functions used to satisfy this objective are help desks, hotlines, debugging training, user groups, unit liaisons, and newsletters.

Increasing user productivity through office automation and data access is the goal of 52 percent of the respondents. Specifically, information center staffs are trying to assist users in getting their job done more quickly through the electronic workstation. Promoting mainframe connectivity for electronic mail, data transfer, and miscellaneous office functions (graphics, spreadsheets, databases) provide the range of methods being used to help users achieve this goal.

Information center managers were provided the opportunity to define their role in this process. Figure 5-7 provides further information on what roles respondents see for their organizations in support of the user community.

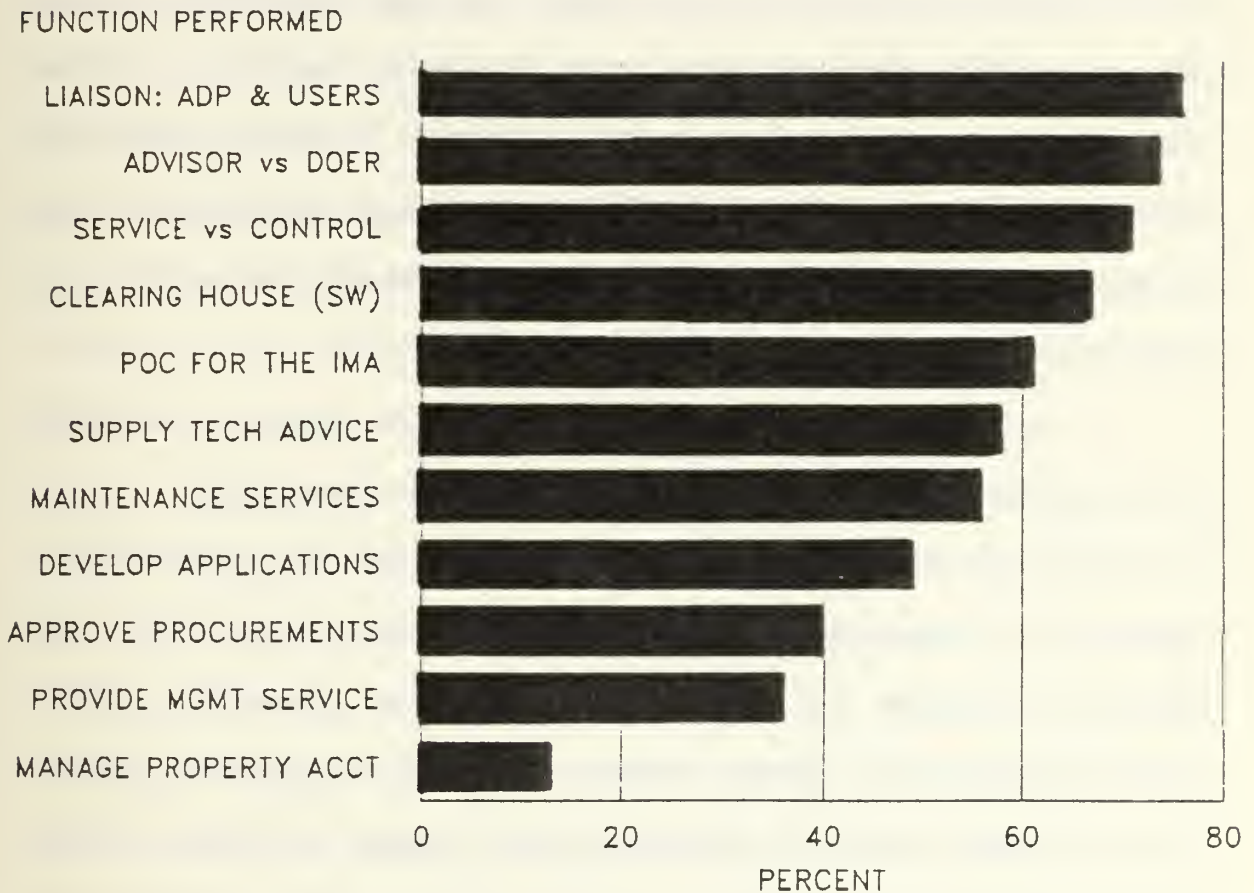


Figure 5-7
Role of the Army Information Center

The results verify earlier survey responses. Specifically, information center staffs see themselves as liaisons between the users and the world of automation. Only 44 percent develop applications for their users, preferring to serve as advisors

rather than active participants. Property management is only being employed by 16 percent of those responding although this appears to be a growing responsibility.

3. Future of Army Information Centers

Three specific roles for future Army information centers were identified in response to a free form question contained in the survey. One or more of these three roles were cited by 92 percent of respondents as primary reasons why information centers are critical to the success of information management at their installations. The following discusses each of the three subjects as well as factors that hamper the ability to perform those roles.

From the authors perspective, one of the most interesting roles elicited from respondents was one of the information center as a change agent. Managers see their information center as the function through which new technology is introduced into the organization. It was noted that the first wave of "office automation" integration has passed, but additional, less perceivable, surges of technical innovation will continue to affect the end-user environment for years to come. The following reply typified responses regarding the future of Army information centers:

While traditional information center roles (training, user support teams, planning, forecasting, etc.) will continue to exist, a host of new customers, with new data processing problems will emerge. These new customers will be driven by new technologies and new requirements. The information center role must expand to meet this challenge (TACOM, KENNETH SIMPSON).

A second category of responses indicates that managers see the information center as a complementary operation to the integration of IMA functional areas. They envision the information center as the front door to the IMA

through which organizations will submit all requests for IMA services. Respondents cited the view that no other function within their organization could provide a unified front for IMA activities without additional reorganization.

Finally, increased user productivity was quoted as an overwhelming reason for continued support for Army information centers. Those responding indicated that supported organizations have experienced an increase in productivity of key personnel due to increased availability and quality of data generated by end-users. This group indicated that information centers provide supported units with resources to solve information related problems, efficiently eliminating previous obstacles.

Managers appear to realize that the benefits discussed above do not come without a price. The survey indicated that 60 percent of information managers see that technical and managerial expertise as well as overall quantity of information center personnel must increase significantly to make their information centers fully capable. The need for improved management support in the form of financial backing was cited as the most critical limiting factor for today's information center. Some said that without this support, their information center would be severely limited in its ability to achieve the most basic functions.

I. SUMMARY

This chapter has provided an overview of responses to a field study completed in conjunction with this research. The study is not intended to provide data for detailed statistical examination, rather it is intended as an indicator of perceptions held by field information managers. Chapter VI incorporates this data with that of

Chapter IV to present issues that should be addressed by the Army regarding information centers and end-user computing.

VI. THE FUTURE OF U.S. ARMY INFORMATION CENTERS

...Our moral responsibility is not to stop the future, but to reshape it... to channel our destiny in humane directions and try to ease the trauma of transition.

Alvin Toffler

The preceding chapters provided a wide perspective on Army information centers and their civilian counterparts, focusing upon where they have been and where they want to go. This chapter develops conclusions regarding Army information center development. The discussion focuses upon only the most pervasive issues revealed during the field study and associated research on information center management.

The chapter offers specific recommendations for integration into strategic planning objectives for Army information management. The theories introduced in Chapter III are employed to identify shortcomings in Army automation operating environments and strategic planning processes. Recommendations for overcoming these shortfalls are then presented

The chapter concludes by examining several roles being performed by Army information centers. These roles focus on expanding the information center function into an extended control mechanism within the DOIM organization. Using the information center in this manner provides direction in the areas of change management, integration of new technologies, and training and policy standards. The

intent is to provide a discussion of where Army information centers may go, not as a discussion of plans already approved for implementation.

A. DEVELOPMENT AND COMMUNICATION OF STRATEGIC GOALS

Information management was characterized earlier as a short-lived, technology-driven environment that is constantly changing to meet the needs of its clients. The field study indicated that many information center managers choose not to plan because of this situation, stating that planning is a waste of their valuable time. They fail to realize that this may be the source of many of their problems. Periods of significant technological change require greater communication between all parties involved in the change process. (Stoner and Wankle 1986)

We conclude that the Army lacks a comprehensive technique for the development of strategic plans for automation integration. The discussion that follows proposes a three step method for the development of such a plan. Each major activity is listed below and then followed by a concise discussion of implications for Army information management.

- Defining the overall, long-term automation objectives for the organization in terms of the environment in which it wants to operate.
- Identifying the current stage of automation assimilation into the organization in terms of technological, organizational, and individual influences.
- Developing a methodology that promotes the evolution of the organization from its current state to that defined in step 1.

1. Defining Long-term Automation Objectives

Defining the overall environment in which the organization wishes to operate is critical to organizational management (Stoner and Wankle 1986). The

advent of rapid technological change in the world of information management only intensifies this requirement. Selecting the environment in which the organization wants to perform reduces uncertainty, effectively providing a foundation on which to base future decisions.

Euske and Dolk's three models serve effectively in the accomplishment of this task. Their models require that the organization first determine the environment in which it will operate (Bureaucratic, Norm-based, or Virtual-Market) followed by the development of a strategy for operating in the chosen environment.¹

The environment in which the Army wants its information management functions to operate is unclear. It is possible that the Army, through the Policy and Planning Directorate for DISC⁴, has made this decision.² However, the communication of this decision to information managers in the field is lacking (O'Connell 1988). It appears that although some of the key leaders on the Army Staff have accepted this philosophy, a ratified policy, supported by all, does not exist.

The environment prescribed by DISC⁴ as its preferred operating environment appears to be that of Euske and Dolk's Virtual Market Model (Euske and Dolk 1988). The model implies that pursuing the Virtual Market environment

¹ Euske and Dolk's Control Strategies for End-user Computing is discussed in greater detail in Chapter 3. Those concerned with implementing the theory should refer to that chapter or retain a copy of the original paper.

² The goal defined by DISC⁴ and discussed in Chapter IV, is one of using automation technology to improve user productivity, serving as a means to an end, not as an end in itself.

provides optimal data integrity and product quality. Euske and Dolk characterize the Virtual Market Model as an environment where users are able to achieve optimal productivity by using the products that satisfy their individual needs. These objectives support the goals for Army information management as conveyed by DISC⁴. However, the acceptance and absolute commitment of this far-reaching policy by senior Army leadership has not been conveyed to the field.

The conclusion of this research is that widespread support of DISC's proposal for the operating environment of Army information management fails to exist. Furthermore, we assert that this support could be attained through increased communication of a unified goal for information management. A unified approach to this decision would reduce the uncertainty associated with the direction and future of Army information management and information center development. The resolution of this issue would also provide clearer guidance to field managers, resulting in diminished policy conflicts between information centers, DOIM's, ISC, and The Army Staff.

2. Identifying Organization's Automation Integration Stage

This phase of the planning process involves identifying the level of automation integration in three domains:

1. The complexity/amount of technology in use.
2. The level of automation influence on the organization.
3. The level of individual computer skills possessed by the majority of the organization's members.

The level of technological integration into the organization focuses upon the actual hardware and software tools employed in routine mission functions. This relatively simplistic assimilation process requires identifying the amount of automation technology in the organization and its overall level of complexity. Current levels should be compared with those expected to achieve the goal state defined earlier.

The next stage of this planning process involves classifying the amount of influence automation exercises over the organization. Here, the concentration lies on determining the level of automation technology in daily activities. Today, the organization may be using stand alone micro-computers. However, the goal state of the organization may require both local and wide area networks. Identifying this transition is critical to the development of transition strategies.

The final step in this process is categorizing individual computer skills. This process is best facilitated by using one of the existing models for classifying end-user computer literacy presented in Chapter III. Successfully facilitating the migration of end-users from one stage of computer literacy into another can be very costly in terms of productivity and training funds in the short term. Failing to identify these costs early may cause significant turmoil later. Therefore, this process should be thoroughly reviewed and briefed to both management and employees.

It becomes apparent that the accomplishment of these tasks requires leaders to know their organization. Often this will require some research to accurately identify categories and levels of performance. However, in doing so, the organization's leaders may be exposed to the true strengths and weaknesses of their

organization. Correctly identifying these situations provides a base from which leaders can plan, further reducing uncertainty.

This research indicates that none of these steps have been incorporated into any type of strategy for the development of end-user computing in the US Army. Furthermore, change management appears to be non-existent in current automation integration plans. The integration of the IMA functional areas appears to be the closest the Army has come to planning of this nature.

Therefore, we conclude that there is a substantial need for analyzing Army information management systems as specified above. The results of this appraisal should then be incorporated into the final phase of the planning process documented below.

3. Planning for Evolution Into the Selected Environment

Following the successful completion of the first two steps of the planning process is the development of a plan for transition from the current state into the goal state. This process will occur at two levels within the Army due to the diversity of the organization.³ Specifically, the Army staff should prescribe an overall strategy for attaining its goal operating environment. Subordinate installations should then study this strategy and develop a specific approach for achieving their own command objectives as well as those of the Army.

³ The need for macro type planning at Army level with augmentation by subordinate commands was discussed previously. Further information on this issue is documented in Chapter IV.

The results of the field study indicate that the bulk of Army computer users are developing basic applications. The unstructured responses indicate that these applications are programs designed by the user for one purpose in one organization, without any intention of integration into other programs. Munro and Huff define this level of application maturity as Stage 2 (stand-alone) (Huff, Munro, and Martin 1988).

Munro, Huff, and Martin's four phase model provides a method for controlling the rate of growth experienced by the organization. Their theory can be used by the Army to define a reasonable growth pattern which Army organizations could follow. This pattern should define evaluation points and measures against which growth can be periodically appraised. The results of each assessment could then be used to determine growth rate and its relation to the defined schedule. Appropriate adjustments should then be determined and distributed to subordinate installations.

Each installation would then be responsible for integrating the specific needs of their organization in conjunction with Army guidance into a single information management strategy. This activity should be a joint task accomplished by the supporting DOIM and the operational commands represented on the installation. This process could be orchestrated by the information center as outlined in Chapter III.

This proposed Army strategic planning process for automation integration is a prototype for automation integration that should be considered for integration at all levels of command. The remainder of this chapter focuses on issues that should

be addressed in installation information management plans and executed by local information centers. Successfully incorporating these roles should facilitate the integration of proposed information management plans such as the IMA concept.

B. EXPANDING THE ROLE OF INFORMATION CENTER ACTIVITIES

The integration of IMA functions into Army information center implementations should further facilitate the role of the information center as a leader in information management. Developing an integrated information systems strategic plan at all installations provides the next logical step in the strategic planning process. The roles proposed for information center management throughout the remainder of this chapter are intended to integrate information management objectives with requirements facing end-user organizations in the US Army.

1. Expand the information center role in change management.
2. Assist local commanders and their staffs in the development of policy and the subsequent supervision and/or execution of training of all installation personnel in IMA areas.
3. Assist local leaders in the establishment of procedures regarding Army information management policy.
4. Define local information standards for end-user activities.
5. Assist local commanders in developing programs that accomplish organizational information management plans.

1. Communication and Resistance to Change

The effective management of change serves as a valuable companion to strategic planning when significant technological change is expected. Therefore, the

focus of this discussion will now shift to the effects of change and the associated need for communication between involved parties.

Chapter II identified the effects of significant technological change on organizations. The results of the field study demonstrated that only 58 percent of the respondents indicated that the IMA was a practical concept, and only 69 percent felt that it was generally a good idea. These figures may seem sufficient to some, however this research indicates that a change as significant as this may require greater support from field managers.

The resistance to these changes may be signalling that there is something wrong with the concept or the manner in which it has been presented (Stoner and Wankle 1986). Viewing the results of the survey documented in Chapter V in conjunction with the change management models discussed in Chapter II indicates that overcoming this resistance may be critical to the continued success of Army information centers. After all, the integration of the IMA is official policy, failure to execute the policy effectively may be grounds for reorganizing functions, thus slowing the process.

Kotter and Schlesinger (1979) provide several methods for overcoming resistance to change in these situations. They identify education and communication as the most effective sources of conflict resolution in such cases. Facilitating and supporting the change by providing key leaders significant positions in the change process also eases the transition process. Finally, successfully explaining the logic and long range significance for the reformation as early as possible in the evolutionary process smoothes the path to successful change integration.

Tomorrow's information center could be regarded as the facilitator of automation integration for the installation. Serving in this capacity, a fully manned information center staff should provide expert knowledge on leading edge, user oriented, technology. Their mission should include providing solutions to user needs through the infusion of advancing automation technology.

Army leaders need to define methods for introducing new technology as required which sustain minimal negative effects. We believe that the Army should devote further effort in this area in its IMA integration efforts. Furthermore, managing the effects of change should be considered in greater detail when incorporating new technologies in the future.

2. Development of End-User Training Policies

Training issues were discussed in some detail in Chapter V. Information center managers should identify problem areas in the training arena, assisting commanders in the development of training policy and standards for information management. The issue serving as the focal point for user training policies is the identification of long-range user proficiency goals. By establishing a long range goal, the Army enables all subordinate commands and, most importantly, the users themselves, to plan for the accomplishment of the mission.

This critical objective must be met in order to eliminate uncertainty in the minds of soldiers throughout the Army. Specifically, they must realize that computer literacy is being encouraged and expected of them. The establishment of management commitment to the growth of user computing skills combined with the

identification of long-range user goals should motivate soldiers to improve their proficiency in this area.

3. Establishment of Information Management Policies

Policy is stated as the "intent or direction of management". It answers the question "What do I do?" Senior management (HQDA and ISC) determines what is wanted and subordinate commands develop policy and plans for accomplishing that task. (Perry 1987)

The integration of information center managers into the mainstream of information management leadership assimilates the needed technical expertise and awareness of user issues into the planning process. The information center manager should propose policies for information processing throughout the organization/installation. Additionally, the information center manager should lobby for the acceptance of policy statements aimed at defining a direction for information management throughout the organization. Policies such as the following should be proposed by the information center manager in an effort to provide such direction: (Perry 1987)

1. **Acquisition of Processing Resources** -- Addresses issues of compatibility and procurement procedures that involves a central approval authority.
2. **Information Security** -- Establishes access restrictions, guidelines and procedures. May specify management and user training programs.
3. **Information Integrity** -- Defines issues regarding information quality and entry guidelines. Pertains largely to database activities. Specifies training issues and guidance.
4. **Information Transportability** -- Deals with the transfer of data over local or wide area networks. Addresses connectivity issues for telecommunications and data transfer protocols.

5. **Software Development** -- Addresses the development of applications that users/management may feel are outside the realm of their development expertise. Establishes guidelines for making such decisions. May provide for the brokerage of applications developed within the organization/installation.
6. **Budgeting and Justification** -- Defines the methods for calculating the benefits derived from user computing and the subsequent budgeting process.

The policy issues described above are by no means exhaustive. They are intended to provide examples of policies aimed at defining management's plan and direction in areas that are confusing or in need of specific guidance. Once established, the policy should be enhanced as necessary and enforced as required (Perry 1987). Specifically, these policies should not be proposed without a system of controls designed to ensure the enforcement of policy objectives. Without an enforceable system of controls, policies are worthless.

4. Defining Information Standards for End-User Activities

Standards provide the means necessary for determining the proper execution of policies. Each policy defined by information management should have some form of standard by which it is to be measured.

Methods of developing information standards differ from organization to organization. However, the involvement of the organizations required to follow the standard is critical. This involvement can take the form of round-table meetings or staffing of proposed standards through all agencies involved. Additionally, a schedule for the implementation of the standards is necessary to facilitate the support of leadership involved in the integration of the policy. Finally, the approval

of the standard should be provided by either a central figure such as the DOIM or a steering committee comprised of affected organizations.

5. Development of Program Implementation Standards

Implementation of the policies and standards is accomplished through the development of programs. The program is what the organization's users execute in order to attain the goals described by the policy. Programs may be specified as either mandatory or optional in nature, depending upon the intent of the policy itself. Procedures refer to mandatory programs and guidelines to optional programs. (Stoner and Wankle 1986)

End-user computing, by nature, should be managed in a decentralized manner. Therefore, the number of guidelines should exceed that of procedures. Information centers should be involved more in the issuance of guidelines than procedures. However, security, integrity, and procurement issues are generally directive in nature.

Issuing action programs for policy and standard issues as they are released reduces the resistance to the policy itself, effectively providing the user with guidance for the accomplishment of the policy. The simultaneous release of these documents provides for a smoother running organization.

C. RELATED ISSUES

1. An Evolutionary End-user Strategy

The challenge presented so far has been one of satisfying the demands of end-users while advancing an end-user development strategy that meets organizational needs in later years. More simply, leaders need to strike a balance

between management support (organizational push) and operational control strategies. The balance between these two strategies must evolve continually, based upon the needs of the organization and its employees. Maintenance of this evolutionary strategy by management remains critical to the success of end-user computing within the organization.

While controls may help to focus end-user resources on building systems in areas most critical to the organization, it can also unwittingly restrict learning and innovation, thereby creating general dissatisfaction among end-users. On the other hand, a laissez-faire attitude holds no assurance that the most critical areas of the organization will receive sufficient resources. This strategy can also result in a chaotic and expensive mixture of information technologies that impede future progress. (Henderson and Treacy 1986, p. 5)

2. Providing Expanded Services With Limited Resources

Government agencies are all fully aware of the impact of limited funds. It is expected that budgets over the next four years will continue to be constrained or significantly reduced. Funding is expected to be one of the most significant limiting factors facing the military during this period (Craven, 1988).

These facts, combined with the increase in demands being forced upon the information center staff by IMA integration requirements, will force the Army to maximize the effectiveness of existing employees. Methods of increasing information center capability include (1) Increasing the size of the IC Staff, (2) Creating liaison positions, (3) Developing increased productivity through automation.

Increasing the size of the IC staff may be possible only by laterally transferring personnel from one staff to another. While this is possible with the integration of the IMA into the information center function, the likelihood of any organization willfully releasing any of its staff is very low. Requests for such

transfer will serve to create additional resentment toward the information center and the IMA concept in general.

The creation of liaison positions is likely to provide better support from all agencies affected by the IMA transition process. However, command and control over the liaison function may prove to be a sensitive issue. However, the use of "super-users" as liaison personnel between the IC staff and supported agencies has proven to work quite successfully. The relative success of liaison methods has generated effective measures for procedural control of the process. However, this approach will create more intensive communication needs, a situation that often creates serious problems in and of itself. Therefore, the implementation of liaison functions between user departments and IMA functional areas may only provide a partial solution to the situation.

Recent studies indicate that in excess of fifty percent of an information center staff's production involves answering routine customer inquiries. (CRWTH 1987) Development of a knowledge based system to answer commonly asked questions may offer the greatest opportunity for increased productivity. This method involves the automation of labor intensive tasks within the information center. Automating these tasks can be implemented in conjunction with either of the methods discussed above to provide an increase in productivity and communication when implemented over a local or wide area network. The objective of the process is to develop a knowledge-based system that can answer commonly asked questions with precision, effectively solving the customer's problem without involving a technician. If the system fails to solve the customer query, a technician is

summoned by the system for a personal interview/query session with the user. The system may be totally automated, accessed over the network, or it may be used with a human interface (employing a customer service operator operating the system in support of a hotline).

One example of this approach is the (ICE) Information Center Expert system being developed jointly by the University of Arizona and the IBM Corporation (O'Connell, 1988). This system is being designed to provide a shell for the development of an information center knowledge-based system that can be used as discussed above. Currently, the product is receiving critical acclaim as one of the best productivity enhancements available to the information center manager.

The options for increased productivity through the automation of information center tasks are virtually limitless. Computer based training can be used to satisfy the bulk of basic training needs. Computer based training could also be employed to provide instruction on basic computer maintenance and peripheral installation tasks. An automated newsletter could be passed between separate IC's using a "fill-in-the-blank" concept, facilitating effective transfer of information between facilities. These are only a few of the many options available for the automation of the seemingly endless labor intensive tasks performed by the information center staff.

The knowledge exists for the development of this type of automation. However, individual information centers will not be able to develop such applications alone. They are still trying to grapple with day-to-day operations.

Therefore, the Information Systems Command and the Department of the Army will have to provide funds for the research and development of such programs.

E. SUMMARY

Information centers in the near future will be multi-disciplined operational activities that provide integrated customer support to users in the five IMA functional areas. Plans proposed by the Army for accomplishing this integration are incomplete. This chapter provided a model designed to augment this process. The remainder of the chapter focused upon the roles of information center management that are designed to fuse user requirements with information management objectives.

Integrating these issues into one concept is not an easy task. The models described do not furnish all of the answers to the development of integrated planning practices. Rather they serve to provide a starting point that can be further developed by Army planners and information managers. Appropriate management policies and procedures need to evolve more quickly in order to effectively direct the integration of information management and the subsequent development of Army information centers.

VII. CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes recommendations based upon this research. The discussion begins with a concise overview of the approach employed in the research process, then presents major issues addressed in the paper, identifying specific problems the study was seeking to address. Solutions are then proposed to problems facing Army information center development. The chapter concludes by recommending topics for further analysis.

A. OVERVIEW

The purpose of this thesis was to examine current policy and strategic planning objectives for information centers in the US Army. Accomplishment of this objective was achieved in several stages. Each is identified below, followed by an overview of the process:

1. A review of the information center concept as defined by the information management industry.
2. A presentation of theories addressing management control issues for end-user computing.
3. A history of information center development in the US Army.
4. A field study of information centers in the US Army.
5. A presentation of strategies for improving the effectiveness of information centers and the management of end-user computing in the US Army.

The research began with an in-depth review of publications and research literature addressing information systems management, end-user computing, information center practices, and strategic planning. This assessment provided a

historical perspective on information center issues, ranging from the establishment of the information center concept to concerns facing all information managers. Research was then directed toward cataloging management control theories related to end-user computing and information management objectives. Several theories focusing upon the necessity of control strategies for end-user computing were discovered during this process.

Interviews with leaders in the field of Army information management resulted in a field study concentrating on Army information center management. An analysis of the responses collected during the field study and the aforementioned interviews was then conducted. A set of recommended solutions addressing the more pervasive problems identified during this study were then developed and presented.

B. PRESENTATION OF RESEARCH QUESTIONS

This study focused primarily upon defining the role of information centers in the U.S. Army. Accomplishing this task required identifying the role of end-user computing and its effect upon information center development. Once these objectives were achieved, we investigated the brief history of Army information centers and defined their current role in achieving the goals of Army information resource management. Accomplishing these objectives involved answering the following questions:

1. What are the significant benefits and limiting factors of information centers ?
2. What trends are developing in end-user computing and its support by information centers ?
3. Is there a need to control end-user computing or will the passage of time eliminate the need for such policies ?

4. Should organizations plan for the integration of automation technology into their working environments ? If so, how can this process be integrated into strategic plans for the evolution of information management.
5. Has the Army communicated a need to manage end-user computing ? How are Army organizations developing and implementing policies to accomplish this task ?
6. What roles do senior Army leaders expect of information centers in the evolution of information management ?
7. Is there really a need for information centers in the US Army ? If so, what roles do they perform ?

C. CONCLUSIONS AND RECOMMENDATIONS

The most significant limiting factor facing Army information centers appears to be an inadequate definition of their role in Army information management compounded by an ever increasing demand for services. This situation has created confusion and inefficiencies in Army information management. Chapter VI identified a comprehensive methodology for dealing with this situation. It must be noted however, that this condition is expected to continue until IMA integration plans are complete.

The need for developing end-user control strategies in the integration of automation technology was confirmed. This conclusion was generated following the study of management control theories, change management, and strategic planning practices. Developing policies that support end-user computing while providing direction for future accomplishments appears to reduce stress and improve performance. Furthermore, senior management is able to guide the evolution of its organization, procurement practices are integrated, and middle managers are provided

with the guidance for effective training strategies. Additionally, the members of the organization become aware of their responsibilities in the accomplishment of the organizations strategic automation objectives. Accomplishing this three-pronged approach¹ to automation integration should promote a unity of effort in achieving long-term goals.

Accomplishing this task provides only a partial solution. The field study indicated that although the Army has a major revitalization of information management in progress, the IMA, this concept is not fully supported by field managers. We suspect that a significant contributing factor in this situation lies in the failure of the Army staff to communicate its plan effectively. The research indicates that communicating the theory behind the plan is as important as communicating the plan itself. Accomplishing this task appears to provide a less turbulent environment conducive to significant organizational change.

We determined that the management of end-user computing has been pushed behind the scenes during the development of the IMA concept.² Currently senior leaders involved in developing Army information policy have chosen to avoid this topic, preferring to address the subject as the "integration of the electronic workstation" (Craven 1988). Limited resources may have mandated this approach,

¹ The integration of end-user control theories, change management, and strategic planning practices into a comprehensive information management policy was discussed in detail in Chapter VI.

² The IMA concept is a far reaching plan designed to integrate a large portion of Army information management. It is discussed in great detail in AR 25-1, Dec 1988.

however, the Army needs to address the integration of positive end-user control mechanisms if it is to achieve the environment in which the IMA was designed to operate.

The information center could serve as a critical component of this process, functioning as the liaison between the user community and the world of information management. This is especially true if the Army wants the support of field commanders in achieving its information management goals. Information center managers can work with supported commanders to develop plans, policies, and training programs that strive toward this unified goal. However, achieving this situation will require fully defining the role of Army information centers in future Army regulatory guidance.

We conclude that information centers can be a key player in the integration of Army information management objectives with the goals of operational commanders. Staffed properly, the information center provides an excellent organization for the accomplishment of this objective. However, achieving this goal will require resolving the issues presented in this thesis.

D. OPPORTUNITIES FOR FURTHER RESEARCH

The scope of this research was limited to the development of management techniques to cope with major issues faced by Army information centers. However, the analysis uncovered a wealth of questions that extend beyond the prescribed limits of this analysis. The discussion that follows identifies topics worthy of further study. Research into any of these issues may potentially benefit the Army, the information management community, and the school.

Observers have stated that the information center will cease to exist after the wave of enthusiasm regarding end-user computing has subsided. Such statements imply that the information center is simply a fad that exists solely to "get users through" their baptism into the world of micro-computers. Are there alternative organizations that could perform the information center mission better, or is the concept as worthy as this research indicates?

Another issue relates to increasing productivity and reorganizing the framework of information center support. The development of a centralized or regional user support center that is responsible for accomplishing tasks common to most information centers may increase the productivity of individual information centers. The GPSCC discussed in Chapter IV was organized in part to perform this function but has failed to provide the support needed by the information center community. This organization could enhance the productivity of individual information centers through the performance of the following functions:

1. Serve as the monitor of the automation of personnel intensive tasks common to most information centers. This could include the development of an automated tool such as the ICE system discussed in Chapter IV. A regional information center could provide project management capabilities for the maintenance of such a system, offering updates to supported organizations as required.
2. Serve as the liaison to DA and ISC, representing the end-user and organizational needs. This will prove an important function in the planning process as the integration of automation into the military progresses and the number of users increases.
3. Facilitate the feedback process between information centers. This could reduce the duplication of effort that currently plagues the community.

4. Serve as a central software and hardware clearing house similar to the Defense Industrial Plant Equipment Center (DIPEC).³

The issue of charging (chargeback) for information center services is being considered by Army Policy makers. The advent of financial restrictions will mandate the increase in productivity of information center staffs or the reduction of demand on those installations affected. Chargeback procedures serve to reduce demand while generating an audit trail to show the benefits derived from the services rendered. However, it has been asserted that the cost of maintaining the system may be greater than the value generated. Conversely, some officials maintain that short run costs may be recovered by long-term savings created by forcing users to be more independent. Specifically, the need for services is put into perspective, forcing the user into trade-off analysis. Is this necessary or will it threaten the development of Army end-users?

What impact will local and wide area networks impact have upon the information center? Although networks may facilitate the integration of the IMA and enhance the use of computer based training, they may also contain the seeds of obsolescence for the information center.

End-user computing has opened the "window" to a new office environment. Information centers pose the opportunity to manage this new environment, regulating the speed and direction in which the evolution progresses. The goal of a truly

³ All DoD agencies and military departments are required to notify DIPEC prior to the purchase or sale of all Industrial Plant Equipment with a purchase value in excess of \$ 5000. DIPEC maintains a clearing house record of all such equipment in the DoD. All requests are screened prior to approval to confirm or deny the possibility of avoiding unnecessary procurements.

optimized office will eventually obscure the distinct structures of ADP departments, information centers, and user organizations. However, until this state is achieved, there exists a need for a liaison between these functions, one that understands the requirements of all three and facilitates a synergistic operating environment for all. We believe that the Army information center provides the best candidate for the performance of this task.

APPENDIX: THE INFORMATION CENTER SURVEY

This appendix provides an example of the survey used to accomplish the field study documented in Chapter 5. The survey is an eight page, semi-structured questionnaire that provided respondents with the opportunity for free-style comments. The poll provided definitions of terms critical to respondents and was followed by partitioned questioning.

1. End-User Computing (EUC)- The direct hands-on use of the electronic work station (any type of computer or network services) by people who have a problem that requires some sort of automation or communication support. We recognize that End User Computing is a negative term to some, yet no better term has yet been provided. If anyone has found a more appropriate term, please submit it with your remarks. The Army needs a definitive term to describe this phenomena.

2. Information Center (IC)- The facility provided by any large organization or installation that is used to support local computer/information system users. The formal mission of this facility is to facilitate and coordinate these activities such that these users become able to program their own solutions to computer based problems. Examples of the services provided to accomplish this task may include user training, technical assistance, planning for future information system applications, product evaluation, clearing house functions, service operations, and liaison activity between mainframe AD managers and user groups.

3. *Electronic Work Station* - The environment in the office or work area in which the user operates. Commonly this is, but not limited to, any type of computer terminal or device that provides the user with the resources to accomplish their mission. The Electronic Work Station correlates with the idea of an employee working at a computer terminal that has access to all of the hardware and software necessary to accomplish their every day tasks. These assets may be stand alone or provided as part of a larger system or network.

4. *Computer Literacy* - The level of experience a computer user attains through training and experience in the use of the electronic work station environment. Development of the user usually progresses along a common path called growth stages. These stages are often used to determine the collective level of computer literacy in an organization. This information may then be used to determine the services offered by an information center.

I. *BACKGROUND/ HISTORY*

The following questions relate to the general characteristics of your information center. Pinpoint accuracy is not necessary, this data will be used in establishing general trends only.

1. What type of ADP organization existed to support users prior to founding of IC ?
 - A. Mainframe
 - B. Mini-computer
 - C. Micro-computer user groups
 - D. None
 - E. Other (please describe)
-

2. Was the information center founded prior to the September 1985 directive from the Department of The Army.

- A. Yes
- B. No

3. If your answer to number 2 was yes, was the organization required to have an IC by some local regulation or directive, or was the center established due to local demand for these type of services.

- A. Local directive
- B. Demand for services

4. When was your information center founded ?

_____ .

5. Please estimate the number of users supported in the community.

- A. 0-200
- B. 200-400
- C. 400-600
- D. 600-800
- E. 800-1000
- F. 1000-1500
- G. More (estimate please)_____ .

6. How much space is the information center provided for its offices (business/office/consultation) ?

- A. 0-500 Sq. Ft.
- B. 500-1000 Sq Ft.
- C. 1000-2000 Sq Ft.
- D. More

7. How much space is provided for classroom instruction ?

- A. 0-500 Sq Ft.
- B. 500-1000 Sq Ft.
- C. 1000-2000 Sq Ft.
- D. More

8. Rank order the following list of client types according to how often they require information center services. If there is any major group we have omitted please write them in the space provided.

- ___ Enlisted soldiers and entry GS workers
- ___ Mid level NCO's and GS 3-6 workers
- ___ Junior officers and GS 7-12
- ___ Field grade officers and GS 13-15
- ___ Brigade level officers and above and GS equivalents.
- ___ Other (Define) _____ .
- ___ Other (Define) _____ .

II. FINANCIAL ANALYSIS:

The following financial questions may be difficult to answer. We realize that many funds and budgets have been utilized to provide the operating funds to operate the organization. Please estimate the figures as best as possible after reviewing the DOIM's Budget records.

9. What is the total budget you operated on in FY 1987 & 1988 ?
(Operation, Maintenance, procurement, personnel, Facilities)

A. FY 1987 budget total _____.

B. FY 1988 budget total _____.

10. What is the total projected budget for FY 1989 ?

_____.

11. What is the budget for the entire DOIM Function for FY 1987 ? FY 1988 ? FY 1989 ?

A. FY 1987 _____.

B. FY 1988 _____.

C. FY 1989 _____.

12. What percentage of the financial support reported above does the Information Center receive from the DOIM and Installation ?

A. DOIM percentage _____.

B. Installation percentage _____.

III. ROLE OF THE INFORMATION CENTER

13. What do you see as the major roles of the Information Center for your organization? Check the block next to those that you feel apply.

- ☐ 1. Advisor vs Doer
- ☐ 2. POC for the IMA
- ☐ 3. User vs technician oriented
- ☐ 4. Clearing house for software
- ☐ 5. Liaison between user and formal AD services
- ☐ 6. Management vs Administrative function
- ☐ 7. Service vs Control function
- ☐ 8. Maintenance service for users
- ☐ 9. Provide application development services if needed
- ☐ 10. Manage property accountability of End-user Information Systems type assets (Hardware, software, etc.)
- ☐ 11. Supervision of Micro/Mini- computer appropriation transactions (Approval/consent of contracts to purchase/lease hardware and software)

14. Provide a short description as to the mission of the information center at your installation. What do you see as its reason for existence ?

IV. SERVICES

The services offered by the information center are intensely installation/organization specific. Therefore, the nature of these questions is to help define the level of management control implemented by your information center rather than to develop a list of services provided.

A. Training

15. Do you offer any training to the leaders that are to supervise the users that you train. If so, on what subjects does this training focus?

- a. Do not offer such training
- b. Offer training on the following subjects:
(Check all that apply)

- ☐ Overview of supported software programs
- ☐ Data integrity
- ☐ Software/hardware compatibility
- ☐ Quality control/ management
- ☐ Hard disk management and security
- ☐ Others (Specify please)

16. Have you witnessed a major shift in the type of training requested over the last year ?

- A. Yes
- B. No
- C. Comment if desired:

B. Hardware support

17. Are the majority of your clients Mainframe or micro-computer oriented ?

- A. Mainframe
- B. micro-computer

18. Do formal controls exist regarding the appropriation of hardware and software ?

- A. Yes
- B. No

19. If the above answer was yes, is the approval of the Information Center required prior to purchase?

- A. Yes
- B. No

C. Software support

20. Does the information center limit the number of "supported" software products ?

- A. Yes
- B. No

21. Please provide a list of the software programs currently approved for support by the information center.

22. Does the staff informally offer assistance to users with non-standard software?

- A. Yes
- B. No

V. THE INFORMATION MISSION AREA (IMA) CONCEPT

The incorporation of the IMA concept into the Information Center mission is possibly the greatest change the Information Center will face in the immediate future. Currently, research is being conducted regarding how Information Center will support the IMA functions. The following questions are directed in an effort to determine how much the information center management has been involved in the discussion of this subject.

23. Has the integration of the IMA concept into information center services been discussed between the DOIM and the IC Management ?

- A. No
- B. Yes

24. If the answer to question 1 was yes, how much time has been spent in the last year planning for the integration of IMA areas ?

25. How many hours of planning has taken place regarding the integration of the IMA functions into the Information Center?

26. How many initiatives have been incorporated into current planning or policy regarding the IMA concept for information center utilization and operation?

27. Do you provide any referral services relating to the five IMA areas ?

- A. Yes
- B. No

28. If your answer to 27 was yes, please indicate which areas you provide referral services for.

29. Please provide your personal views regarding the IMA Concept :
(These results will not be released by the project officer)

1. Is it supportable? Yes / No
2. Is it practical? Yes / No
3. Is it a good idea? Yes / No

30. How do you envision the IMA concept being integrated into the planned development of your IC ?

Comment:

VI. STAGES OF USER COMPUTER LITERACY

The following discussion centers around the level of computer literacy that Army personnel have achieved. We are all aware that with some basic training, virtually all computer users can be quickly transformed into intermediate level computer users. The question we are trying to resolve is the level of competency we have achieved thus far in our development. Base your answers on your every day experiences.

31. Please classify your clients with regard to their level of awareness and overall computer knowledge when the IC was founded .

- A. Minimal knowledge
- B. Intermediate computer literate
- C. Highly market wise

32. Classify your view of how your information center is currently being operated.

- A. Like a standard computer center
- B. Like a service center
- C. Like a brokerage operation

33. Indicate how your IC implements planning and control measures.

- A. Centralized
- B. Informal controls and procedures
- C. Few controls, more monitor oriented

34. What type of applications do you assist your clients in developing ?

- A. Basic type operational applications
(spreadsheets, wordprocessor, databases)
- B. Advanced development of the above applications
- C. Basic programming in structured languages
(Pascal, C, Fortran, ADA, etc.)
- D. Advanced programming in the above languages
- E. How to use existing Decision Support Systems
- E. Development of Decision Support Systems
(using expert system shell programs; M.1, Nexpert, etc)

35. Please select the answer which best describes how quickly your clients are progressing in the development of advanced computer literacy.

- A. They are not developing quickly enough
- B. They are developing at an acceptable pace
- C. They are developing too quickly, we can't keep up
- D. They think they are developing more quickly than they actually are.

36. Please provide your personal impressions on the future of Information Centers in the US Army.

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